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Minnesota Medicine

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ORIGINAL ARTICLES

THE CONSERVATION OF HEARING.*

HORACE NEWHART, A. B., M. D., F. A. C. S.,
Minneapolis, Minn.

Diseases of the ear are far more prevalent than is generally supposed. The figures of the federal census for 1900, which returned a total of 89,287 deaf persons in the United States, including 51,870 who were deaf from childhood, and 51,861 who were only partially deaf, represent but a very small proportion of our population who are afflicted with some impairment of hearing. In the outpatient department of the University of Minnesota Hospital with an annual attendance of practically fifty-six thousand, during the past three years between 8½ per cent and 10 per cent have been in the otological clinic.

It is conservatively estimated that in the United States there are not less than 3,000,000 persons who are appreciably hard of hearing.¹ These figures are substantiated by the reports of medical inspection in our public schools, where the examinations are of necessity very superficial. From two to six per cent of all school children are reported as having defective hearing. McCallie and Cornell,² as the result of more accurate tests made in Philadelphia in 1910 and 1911, report defects of hearing in no less than 14 per cent of the series of 530 ears examined.

Von Troeltsch, on the basis of careful physiological tests has stated that in persons over

twenty years of age³ one out of every three has some impairment of hearing.

The wide prevalence and serious significance of aural diseases is even more strikingly suggested by our mortality statistics.⁴ The records of Guy's Hospital show that disease of the ear was the cause of death in one out of every 158 deaths. In the Vienna General Hospital the ratio was one to every 232, and in Copenhagen one to every 303. Dr. Koerner, of Rostock, reviewing the carefully kept vital statistics of Prussia, has stated that no less than 4 per cent of all deaths occurring under thirty years of age are due to diseases of the ears. In this rather surprising statement he is upheld by Prof. Bezold, of Munich.

Otology is one of the youngest of the surgical specialties. As such it has made equally rapid progress with other departments of medicine. Through its achievements in surgical diagnosis and in the surgical care of middle ear suppurations, labyrinthine affections and intracranial complications, it has already accomplished much in the saving of life and in the conservation of hearing.

Unfortunately the fact remains that during the past twenty years little advancement has been made in the treatment of those cases of progressive deafness due to chronic non-suppurative disease which constitute so large a proportion of those who are hard of hearing.

Thus the medical profession is confronted by the large problem of preventing the vast amount of economic inefficiency and loss, social embarrassment and isolation and its consequent mental depression, all resulting from avoidable causes. Already there has been successfully established a worldwide movement for the prevention of blindness and for the care and edu-

*Presented before the Southern Minn. Medical Assoc. Mankato, Minn., Nov. 27, 1917

cation of the blind. In consequence, many of our states have responded with beneficent laws which, backed by public sentiment, are well enforced. Up to the present time comparatively little interest has been manifested in the prevention of deafness, though much has been accomplished in the interest of the totally deaf.

In spite of the fact that otology holds a place of ever-increasing importance in medical education, there are still in the profession a large number of excellent general practitioners who, to quote Dr. W. Sohler Bryant,⁵ look upon diseases of the ear as divided into two classes: "First, those that would get well without treatment, and second, those that would not get well with any treatment." This attitude, because of the admitted failure of the profession to be able to restore hearing to the deaf has become widely prevalent and is deeply fixed among the general public.

This almost universal apathy towards diseases of the ear probably does not find its counterpart in any other field of medicine. The reason for this lies in the fact that no other important organ can undergo so great a degree of deterioration without the knowledge of the individual. Originally man is endowed with a far greater acuteness of hearing than he requires in his civilized surroundings. Usually he is not aroused to a realization of his deficiency until he has actually lost from seventy-five to ninety-five per cent of his hearing power. It should be recalled that the acuteness of hearing is quantitatively determined not by the distance, but by the square of the distance at which sounds are perceived.

Without fear of denial it can be stated that over 90 per cent of all cases of deafness are preventable. Pathology teaches that loss of hearing is due to disturbances within the temporal bone causing destructive deterioration of the special sense organ. Generally speaking, the possibility for restoration of function to even an approximation of the normal is in inverse ratio to the time the causal factors have been at work.

With these principles in mind it is plain that our chief efforts in the conservation of hearing must lie in the field of prophylaxis, through the early diagnosis and treatment of every possible etiological factor. The early detection of con-

ditions leading to incipient disturbances of hearing can be assured only by systematic, periodic examinations of every individual.

At the present time the one most effective factor in the prevention of deafness is the medical examination of school children. In the public schools of Minneapolis since the introduction of medical inspection in 1910, Dr. Keene reports the percentage of children with defective hearing has been reduced from 3.7 to 2.1 per cent.⁶ Other communities can show equally good results. This rapid diminution in the number of ear defects must be ascribed in part to the decrease in scarlet fever and measles, through early exclusion from the classroom of all suspected cases.

The hearing tests as ordinarily carried out are necessarily hurriedly made, the purpose being to determine the status of the child's hearing as regards his immediate educational needs. As ordinarily made they are not sufficiently comprehensive to safeguard his future hearing by the early detection of the beginning stages of impairment.

In the tuning-fork tests of Weber and Rinne we have a simple means of revealing pathological changes in the ears, long before they would be disclosed by the usual tests with the watch and voice.

The fork tests are rarely made either by the school examiner or by the general practitioner. This is extremely unfortunate, inasmuch as the technic requires but a few moments for each case, and is so simple that the tests can be made by the school nurse or the teacher. The detection of any departure from the normal standard calls for further investigation by the trained physician who must make a complete examination to ascertain the exact nature of the lesion and of every possible contributing cause.

In children under school age the family physician and the pediatrician must assume all the responsibility, for in children under 6 years of age the functional tests are not reliable. Every case of mouth-breathing, every acute pharyngitis, every unusual discharge from the nares or external ear, and the presence of enlarged cervical glands, should be looked upon as the possible symptom of a condition which, neglected, may lead to ultimate deafness.

The contagious diseases of childhood call for

special vigilance. A large proportion of the cases of deafness originating in early life are due to scarlet fever and measles. During their course frequent inspections of the tympanic membrane should be made and on the slightest indication the medical attendant must be ready to incise freely the reddened or bulging drum-head; for in these cases the infection within the tympanic cavity is especially virulent and rapidly destructive. Should involvement of the mastoid cells occur, immediate posterior drainage of the antrum is the safest procedure, and is the best insurance against a later radical mastoid operation.⁷

The ears of all school children should be examined by the medical inspector at least once a year, more frequently if they are found defective on admission; also after every acute illness involving the upper respiratory tract.

Where medical inspection is not provided, many cases might be detected in their incipency by the school nurse, or in rural communities by the interested school teacher. It is to be hoped that our normal schools will soon demand of their graduates a sufficient knowledge of school hygiene to enable them to intelligently make such examinations as are necessary to safeguard the special senses of their pupils.



Fig. 1.

The urgent need of medical inspection in our rural schools is strikingly illustrated by the photograph here shown, which was not taken for clinical purposes.

While aural examinations at frequent intervals are especially important during the growing period, the proper conservation of hearing demands that the ears of all members of the community should be periodically examined.

Such a procedure can be advantageously carried out in all of our institutions of higher education, in all places where labor is employed on a large scale, by social service workers and by our accident, health and life insurance companies.

In the case of the majority of adults, it is the family physician to whom we must naturally look for the regular examination of the ears. This responsibility he has taken too lightly in the past.

A very considerable number of those seeking medical aid for impaired hearing do so not until after they have themselves discovered their deficiency, when much of their hearing power is irreparably lost. Patients of this class have not received the sympathy and attention they deserve. The busy practitioner, priding himself upon his honesty, too frequently tells such a patient with a frankness which is almost brutal, that he cannot be helped. The result is only to discourage the patient from making any further effort.

If the physician wishes to avoid personally discouraging his patient by giving him an unfavorable opinion, occasionally he transfers the responsibility to a specialist. The latter with equal regard for the truth, but with more tact, will tell the patient that he has probably come too late to hope for any great improvement in hearing, but that with proper treatment, based upon the results of a thorough examination, he may hope for some improvement; but that his chief endeavor must be to preserve his present hearing.

The prognosis is admittedly not good. However, in many such cases much can yet be done to arrest the progress of the degenerative changes, if we but look deeply enough for all the causal factors, some of which may still be at work.

It is in order to specifically consider some of these factors.

Any appreciable hindrance to the free ventilation of the Eustachian tube because of nasal insufficiency should be removed regardless of the age of the patient. The nasopharynx in such cases is usually free, but there may be persistent remnants of old inflammatory processes in the form of adhesions or hypertrophy of the tubal lymph-adenoid tissue. The tubes them-

selves may be non-patent from swelling or cicatricial tissue. They should receive appropriate local treatment, which includes far more than the usual course of inflation and massage.

Very frequently the patient affirms that he has had no disturbance of his tonsils. Careful inspection will often reveal small or submerged tonsils, or hypertrophied stumps remaining after a supposed tonsillectomy, harboring in the crypts and in the supra-tonsillar space an incredible amount of purulent debris laden with pathogenic organisms. Any opinion regarding the condition of a submerged tonsil based upon the ordinary casual examination of the fauces without an instrumental retraction of the pillars and exploration of the crypts, is dangerous. A simple retractor, like the one here shown, we have used for years and have come to regard as indispensable. Its only merit lies in its simplicity and in the fact that with it one can retract the pillars, explore the crypts and supra-tonsillar space, and exert sufficient pressure to evacuate the crypts, all without special discomfort to the patient.



Fig. 2.

Author's retractor for examining tonsils.

Recent teaching in regard to focal infections should cause the otologist to be especially suspicious of all tonsils, however innocent they may appear on the surface.

Though pathological proof is lacking, clinical experience in many cases has convinced us that impaired hearing and labyrinthine irritation manifesting itself in tinnitus and vestibular symptoms, are frequently the effects of toxins originating in submerged, suppurating tonsils, in the blind abscesses of devitalized or diseased teeth, and in smouldering chronic infections of the accessory sinuses of the nose. Whether the toxic products find their way to the delicate nerve endings of the organ of hearing by way of the lymphatics, or are carried by the blood current, has not been proven. Nevertheless, it is a fact that in many cases after the usual forms of treatment have failed, we see an amelioration of the ear symptoms following the removal of the focal infection.

To substantiate this theory, we need only point out the large number of intra-ocular diseases which we now know have their origin in similar focal infections.

In many of our cases of non-suppurative ear disease, in addition to local causes, there are also general systemic disorders at work contributing to the deterioration of the hearing as well as of other bodily functions. Among such may be mentioned diseases of the ductless glands, anaemia, diabetes, acidosis, constipation, and post-syphilitic manifestations such as tabes. Their treatment belongs primarily to the field of the internist, but whoever attempts to diagnose and treat aural diseases must be alert to the recognition of all bodily conditions which may affect unfavorably the course of the ear affection. The etiology of that most unsatisfactorily treated disease known as otosclerosis, is doubtless to be found in some systemic disorder, of which the bony changes within the labyrinthine capsule are but an occasional localized manifestation.

Syphilis, congenital and acquired, is not an infrequent cause of nerve deafness. When it occurs in conjunction with other more apparent causes of the deafness, it may lead rapidly to serious loss of hearing before it is discovered. After several embarrassing experiences, when we failed to secure the expected improvement by the usual treatment, the Wassermann test has saved the situation. This test should be promptly made in all doubtful cases.

Chronic middle ear suppuration exists in from one per cent. to two per cent. of our school children, being more frequent in the lower grades and among children from poorer homes. Every case of chronic otorrhoea, be it in the child or adult, which does not yield in a reasonable time to careful treatment, calls emphatically for the radical mastoid operation. It should be urged not only for the sake of insuring the patient against the ever present possibility of death from an intracranial complication, but also to preserve to the patient whatever residuum of hearing he may possess. Both the public and many of the medical profession need to be educated away from the now obsolete view that the mastoid operation is dangerous to life and is likely to cause increased deafness. The mortality attached to the radical

operation when performed before complications have appeared is negligible, and the hearing in the operated ear is more often improved. Practically never is the hearing made worse by the radical operation when it has been properly performed.

Not until we have removed every possible near and remote cause of impaired hearing can we conscientiously say to our patient who is the victim of progressive deafness that he cannot be helped. And even in the event of failure to restore any considerable amount of hearing, or to stay the progress of his malady, it is our duty to point out to him the great help and consolation to be derived from acquiring proficiency in lip-reading. This expedient, though it be our last resort, inspires the patient to employ and exercise whatever hearing capacity he has left. By doing this he actually stimulates and preserves his hearing power, instead of allowing it to rapidly deteriorate through disuse. Thus he is able to keep in social contact with his fellows and his personal happiness and his usefulness to those about him are materially increased.

We cannot close without pointing out the danger in otological practice of continuing the routine local treatment of inflation and massage of the tympanum in those cases in which these procedures are not clearly indicated or after they are no longer of distinct benefit to the patient. It is easy to fall into the way of doing so unless one checks himself by frequently making tests to control the results of treatment. The abuse of these most valuable procedures leads undoubtedly to further impairment by relaxing the drum-head and ossicular chain, and justly arouses in the mind of the patient a suspicion as to the motives of the physician.

In conclusion, we would emphasize the fact that in order to most effectively meet the large problem of conserving the hearing, there is required the active interest and fullest co-operation of the general practitioner, the educator and the otologist.

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DISCUSSION.

DR. E. W. BENHAM, Mankato, Minn.: Mr. President, Ladies and Gentlemen: It seems to me that Doctor Newhart has covered the subject in a very conservative and careful way. I was very much impressed with his paper. We can all agree with Doctor Newhart that prevention is the keynote in the conservation of hearing and especially so in view of the unsatisfactory results of treatment in well established chronic deafness.

I think the medical inspection of schools is extremely important. It brings nose and throat disease to the attention of the parents at a time when something may be done to check the approach of deafness.

As the writer has shown, a large proportion of ear troubles develop through the agency of the Eustachian tube, and all diseased conditions likely to affect the tube unfavorably should, of course, receive attention, especially diseased tonsils and adenoids, which may cause infection and pressure around the mouth of the tube.

Obstructions and abnormalities within the nasal cavity proper are undoubtedly a cause of deafness through interference with drainage and ventilation. I have tried to examine cases of this kind very carefully with a view to forming a more definite opinion in regard to the true relationship between cause and effect, and have come to feel that with the exception of enlargements of the posterior tip of the inferior turbinates, the middle and upper portions of the nasal cavity are usually at fault in their effect upon hearing. A deviated septum is often the cause of a low grade inflammation of the accessory sinuses by interference with drainage and aeration, and these conditions, reacting upon each other, result in a state of chronic hyperemia or mild inflammation which by continuity spreads to the tube, and thus affects the hearing. Such patients are victims of colds upon the slightest provocation, attacks of sneezing, and a more or less chronic state of irritation and congestion of the nasal passages which, in the aggregate, cannot fail to be injurious to the organ of hearing.

It is usually the case, I think, that operations for the relief of nasal abnormalities are disappointing so far as any distinct improvement in hearing is con-

cerned, but they are often of great value to the deaf patient as a preventive measure, enabling him to retain much longer the hearing he still possesses.

The operation should be selected which will best secure free respiration and adequate drainage and aeration of the accessory sinuses. In this connection, I am inclined to think that many unnecessary and therefore useless operations are done upon the inferior turbinates.

An important point in the protection of the ear is greater cleanliness of the nose and throat during the presence of infectious diseases, and early incision of the drum after the onset of acute otitis. Many times patients go on for days suffering acute pain, until the drum ruptures spontaneously. When we consider the very limited capacity of the middle ear and the delicate nature of its mechanism, we realize how much it may be injured by this delay in providing drainage. Early incision will also, in many cases, forestall a complicating mastoid inflammation.

Venereal disease is not often taken into account with reference to conservation of hearing, yet congenital syphilis is responsible for many cases of hopeless deafness in children. Here again the great value of preventive measures is apparent, in the use of such measures as may be employed to prevent the spread of syphilis and secure for those already diseased a prolonged and systematic course of treatment.

I think in the management of chronic cases of deafness, in a great many instances there is some underlying cause which we cannot get hold of. It may be auto-intoxication, or acidosis, or some toxemia; at any rate, it would seem that there is a disturbance of metabolism which exercises an unfavorable influence on the progress of the case and adds to the situation a factor which makes these cases very unsatisfactory to treat. Perhaps some time we shall be able to get the missing factor and connect it up in a way that it will be of help, but I think that with the exception of the preventive measures, as emphasized by Doctor Newhart, the results of treatment, directed to the ear itself, in a large number of cases, are not very encouraging.

DR. S. MARX WHITE, Minneapolis, Minn.: This subject might be thought to be of interest only to the specialist in this region, but that is not true. The paper to my mind, is of particular interest to the general practitioner and to the internist as well. I think we are all coming to the realization of the importance of periodic examinations, not only in this field, but the periodic examination is coming to be looked upon as a necessity in the general field in the discovery of early signs of degenerative disorders that are incident to our life,—renal disease, heart disease, focal infections, etc. I think that the importance of this periodic examination in this particular field ought to be emphasized. I have been impressed with the temporary deafness that occurs in connection with acute infections of the nasopharynx and I would like, for information, to ask the essayist if it

is not true that particular attention should be paid to those individuals, who, during acute infections, acute colds, pharyngeal disease, etc., show signs of temporary deafness, whether that might not be an index to disorders leading gradually by repetition and indicating by the presence of this local sign, that the beginning of degenerative changes is there? And then another thing that interests the internist particularly in relation to this topic is the question of predisposition of the tonsils in this condition, as that is related not only to tonsillar but to other focal infections in this region. The general practitioner and the internist, I believe, must become more acute and better trained in examining the tonsil. The tendency heretofore has been to make a cursory examination and determine the question largely on the appearance of enlargement or from gross and evident signs of follicular infection. As I have seen it in a considerable experience in focal infections as causing generalized infections, rheumatic, cardiac, cardio-renal diseases, etc., it is often a throat that looks quite innocent when grossly examined that is the real cause of more serious metastatic disorders and I believe that Doctor Newhart is absolutely right when he says that the examination should be very much more painstaking, and that the search should be made into the condition of the pillars and crypts in some such manner as he has indicated here. I believe that this little apparatus (very simple) is the thing that should lie on the examining table of most of us, but it should be more persistently sterilized. It should be the means of getting at the root of the infection, but even then, in my experience, many times the tonsils fail to show evidence of infection because they lie deeper and have been covered by scars, and an attempt to follow the pillars and lymph crypts does not get at the bottom of the thing, and hidden abscesses are present. The very occurrence of adhesions should make one strongly suspicious of the tonsils. One other thing is the condition of the glands in the anterior superior triangles of the neck.

A final point is regarding the deafness which occurs in syphilis. It seems to me that particular pains should be taken in dealing with this type. I have, in reviewing these cases of syphilitic infection, particularly late infections (as the internist sees them), been struck with the frequency with which deafness is reported and would like to emphasize the importance of the Wassermann test in this connection. I think many of us are learning the fact that the single Wassermann is not a reliable criterion. A single negative Wassermann in the presence of other things means little. A positive syphilitic reaction must be followed up by repetitions, possibly by Wassermanns after provocative doses, and not so infrequently by cerebrospinal fluid tests, if possible.

DR. J. W. ANDREWS, Mankato, Minn.: I am not an ear specialist at all but I have been interested in this paper of Doctor Newhart's and the discussion following it. If I were going to discuss the tonsils in reference to the ear, I could not say any more and

could not say it as well as has been said by Doctor White. It is only very recently that I examined a throat and found the anterior pillars were red, but nothing could be seen casually in the tonsil indicating that anything was wrong. I took the patient, noticing the color of the anterior pillars, to a specialist and he very soon found suppurating tonsils in the right side of the throat. Indeed, there was a large quantity of pus deeply buried, which did not show at all until examination was made by the specialist, a more thorough examination than I had made, or perhaps would have made.

One thing I was thinking of when Doctor Newhart was reading his paper,—the large percentage of impaired hearing, partial deafness in the adult, is due to chronic non-suppurating inflammation of the middle ear. Now, if Doctor Newhart would impress upon us the importance of an early recognition of the condition (for these cases come on slowly, before the patient perhaps is aware of it), he will do us a great favor. These cases do not begin in the school, for they do not begin in childhood, but are diseases largely of the adult,—not entirely, but largely.

I want to refer to one other thing which interests me very much in reference to deafness. This is the lip method of talking and I wish the medical profession would put itself squarely on record in regard to this matter for there are many people today advocating talking with the fingers instead of teaching children the lip method. Gentlemen, it is all wrong! Observation and some study of this subject will convince you that it is wrong as can be, and yet the physician at the head of the deaf institution of the state is today advocating the finger method instead of the lip method. If you have seen what I have seen, some of the children, some of the young men and young women that have never studied the finger method, but the lip method entirely, you will be surprised to know that they can hear—shall I say hear?—get the conversation, all of a speech, or all of a reading. As this paper was read here one of them could watch the lips of the speaker and understand it almost as well as we could hear who have good hearing.

DR. H. I. LILLIE, Rochester, Minn.: I have been very much interested in Doctor Newhart's paper on the conservation of hearing. I was unfortunate enough not to hear the first part of the paper. There are one or two things I would like to say in regard to the conservation of hearing. First, that it is very necessary to make a very careful functional test of the eighth nerve in order to tell with what sort of deafness we are dealing. In middle and internal ear deafness the treatment is very different. In either case we must search for the causal factors.

In the internal ear deafness, many factors enter into it, mostly toxic. Some even go so far as to say that otosclerosis is a toxic condition and most likely from the tonsil. In a casual functional examination of the ear, when inner ear deafness is discovered, we are frequently confronted in determining whether it

is auditory atrophy or focal infection. There are many such cases that develop from gastro-intestinal complications and many from focal infection. The treatment is to remove the focus. The eighth nerve is an embryologic nerve and succumbs most readily to infections. The first stage in the pathology is swelling. The degenerative process is more or less progressive unless checked. We are in the habit, in these definite nerve deafness cases, of instituting eliminative treatment.

I am particularly interested in pilocarpin sweats and it is astonishing sometimes what this will do for the nerve deafness type. I recall one patient, a girl, suffering from chronic constipation and focal infection, where we attacked both factors. She was unable to hear conversational voices at all. In two weeks she was able to hear birds singing outside her window. She now has to be very careful about the gastro-intestinal tract, and by keeping that clear, she is able to get on very well.

In adults the middle ear type of deafness is frequently diagnosed when we have a combined condition. Nerve deafness combined with middle ear deafness, is a very difficult type to treat. The middle ear deafness is commonly a catarrhal deafness and the treatment is very much overdone. For the benefit of the patient's future, the less amount of treatment instituted the better. For instance, some of these patients are told to have inflation over long periods of time. Inflation over long periods of time do more harm, I feel, that if they are not instituted at all, for if they are not judiciously performed under proper pressure they produce in the middle ear stronger adhesions than the adhesions that had formed previous to that time, and therefore after six months one finds that the deafness is more profound than when we started, although there is temporary relief following inflations. Another type is due to lack of tonus of the intra-tympanic muscles. They are unable to hold the ossicular chain in proper tonus and result in the sound waves not being properly conducted. This type of deafness is, in our experience, not particularly amenable to treatment. The nose and throat affections causing tubal tympanitis, are of great importance. In the examination of a suppurating ear one must differentiate the tube and tympanum as causal factors. Many discharging ears are due to fluids coming up through the tube from the nose. These ears do well when properly treated. While the ear is discharging the patient hears better.

The question of the conservation of hearing is a very important one and one in which the general profession has a particularly vital interest. It is only through the co-operation of the profession in general and the otologists that we are going to accomplish very much in the conservation of hearing.

DR. NEWHART (closing): I wish to express my appreciation of the interest manifested in this paper as revealed by your valued discussion of some of its points.

It was with considerable hesitation that we laid so much stress upon those causes of impaired hearing which in the past have been considered as of little importance, as compared with the well recognized local causes. I refer to systemic conditions and focal infections. Your acceptance and endorsement of the position we have taken in emphasizing the significance of these more remote factors in producing impairment of hearing is very encouraging. Clinical proof of the validity of our position, I believe is strikingly abundant in the practice of all of us. Pathological proof is difficult to obtain for the reason that it practically never happens that we have opportunity to examine postmortem a case with impaired hearing which has been made the object of close clinical study over a long period, with frequent functional tests. Further, animal experiments in otology are nearly valueless because functional tests are impossible.

Replying to Dr. White's question, we heartily agree with him that those individuals showing a temporary deafness with acute infections of the naso-pharynx, to which they have an apparently increased susceptibility, should be closely scrutinized for damage already sustained and for causal factors, both local and general, the removal of which would improve the general health and would protect the patient against further attacks of deafness.

Dr. Andrews asks us to indicate how we may discover the early stages of deafness. As was stated in one of the paragraphs just read, we find great help in the detection of slight impairment of hearing in the careful application of the very simple tuning-fork tests of Weber and Rinne. These show deviations from the normal long before they are revealed by the more crude watch and voice tests.

Dr. Lillie's reference to eliminative treatment is very pertinent. The general practitioner may question the right of the otologist to prescribe other than local treatment for his patients. It is all important that any condition which prevents the patient from securing the maximum of benefit must be treated. Often it is possible for the otologist to refer the case back to his general practitioner for the treatment of systemic troubles underlying his deafness. When this is not possible, the otologist must himself direct the treatment. In all cases of deafness of any considerable degree, although the obstructive form may be more prominent, there is usually present nerve involvement. The obstructive feature alone responds satisfactorily to local treatment, the nerve deafness responding only to general therapeutics, especially to eliminative measures.

Dr. Lillie's reference to the danger of overtreatment of our chronic cases by local measures is very important.

TUMORS OF THE BLADDER AND THEIR NON-OPERATIVE TREATMENT.*

W. F. BRAASCH, M. D.,
Rochester, Minn.

When the method of removing bladder-tumors through the cystoscope by means of a high frequency current was first introduced by Beer, it was believed that a method had been discovered whereby all such tumors could be effectively cured. It gradually became apparent, however, that certain types of bladder-tumor could be readily removed by this method while others were affected but little by it. It is now recognized that fulguration is applicable only to tumors of the papillomatous type.

The exact pathological status of a papillomatous tumor of the bladder may be difficult to establish definitely. All papillomas are potentially malignant. Clinically, however, the grade of malignancy varies widely. It is generally recognized that such growths as are characterized by a uniform arrangement of cells and staining qualities, and are well confined within the basement membrane, are of relatively benign type. Nevertheless such tumors, when removed, frequently recur and may later change to a more malignant form. It has also been established that papillomatous tumors with an irregular arrangement of cells and staining qualities, and such as infiltrate the tissues beyond the basement membrane, are distinctly malignant in type, and when removed have a tendency to rapidly recur and metastasize. Between these two extremes of papillomatous tumors, various grades of irregularity in formation and staining qualities of cells may be observed, and it may be difficult, from the pathologic picture, to determine the future clinical course. It is, however, often difficult to ascertain the exact microscopic character of a papillomatous tumor from specimens removed through the cystoscope, since the outline, staining qualities, and arrangement of cells, may vary in different portions of the tumor.

As a rule, a satisfactory diagnosis of the nature of a papillomatous tumor can be made by its gross appearance as seen through the cysto-

*Presented before the Annual Meeting of the Minnesota State Medical Association at St. Paul, October 11 and 12, 1917.

scope, together with clinical data. The cystoscopic data which differentiate the malignant from the relatively benign papillomatous tumor are:

1. A tendency to necrosis* and incrustation of the superficial portions, giving it a dirty gray appearance.

2. A heavy, meaty appearance with a thick pedicle, in contrast to the frail structure of a benign papilloma.

3. The frequent presence of an intractable and very irritating cystitis.

Valuable data may be obtained by simple rectal and vaginal palpation which should be done in every case of suspected tumor of the bladder. A malignant tumor involving the base of the bladder will frequently cause palpable thickening of the bladder-wall. When the process has progressed so as to cause a firm, nodular change in the adherent tissues, any operative procedure is useless. It is obvious that no benign tumor could cause such infiltration, and when the latter is present, fulguration would be futile.

It has been found that papillomatous tumors, regarded as relatively benign on microscopic examination, are readily removed by fulguration through the cystoscope, while tumors regarded as frankly malignant on microscopic examination will not react to fulguration. Such tumors as fall in between these two groups may or may not react to fulguration. In the group of papillomatous tumors, when any doubt may exist as to their malignancy, the best method to ascertain the degree of malignancy is through their reaction to fulguration. If a tumor does not respond to three or four such treatments it may readily be concluded that it is of the malignant type and that a suprapubic resection should be done without delay.

Several patients have come under our observation in the past few years who had previously been subjected to repeated fulgurations,—in the case of one as high as twenty—without affecting the bladder-tumor. This is particularly unfortunate, since a tumor originally amenable to operation may become inoperable after the long delay and ineffectual treatment.

Now that the type of tumor which may be destroyed by fulguration has been definitely established, the question arises: How permanent are the results of the removal of tumors by means of this method? On reviewing our records we find that there were 80 cases of bladder-tumor fulgurated at the Mayo Clinic between January 1, 1911 and September 1, 1917. Of this number 50 were relatively benign papilloma, 9 were papilloma of questionable malignancy, 13 were carcinoma, 1 was angioma, and 7 were questionable papilloma. The Oudin current was employed in the earlier cases but more recently the D'Arsonval current has been used, because of its more rapid results.

Of the 50 patients with benign tumor treated, 33 have been re-examined. No evidence of recurrence was noted in 24 patients, who were examined three or more months following fulguration, while 9 had recurrences. Of the 24 patients having no recurrence, the period following the initial treatment was as follows: 2, six years; 2, four years; 1, two and one-half years; 2, two years; 2, one and one-half years; 3, one year; and 12, less than one year. This leaves 24 of 33 patients (73 per cent) with benign papilloma who have been re-examined, without any evidence of recurrence. It is probable that this percentage will be reduced by subsequent recurrence among the patients treated within the last year or two. Of the 9 patients with recurrence there were four who had a recurrence of the tumor following the first fulguration, but who on recent examination were found well, over periods of from 1 to 4 years. In the 5 patients showing a recurrence at the time of the last examination, the interval following fulguration was as follows: 2, four months; 1, six months; 1, six months, and subsequently eight months; and 1 has had three yearly recurrences.

The site of recurrence was found at the original site of the primary tumor in 6 cases, and at different sites in 3. The exact time of recurrence was difficult to ascertain because of the irregularity of examination following fulguration. However, of the 9 patients with recurrence it was noted in 8 in less than six months. In the one patient in whom the recurrence was repeated it was observed one and one-half years following fulguration. No recurrences were

*Albarran, J. Les tumeurs de la vessie. Paris, Steinheil, 1892, 494, p.

noted in cases in which the primary tumor was removed by one or two fulgurations. This is corroboratory of a previous observation that the degree of malignancy is in direct proportion to the number of fulgurations necessary to its removal. Keyes claims that recurrence will usually take place within three months. Of the 3 patients with primary multiple tumors re-examined, 2 had multiple recurrences, which would corroborate Keyes' statement that recurrences following the fulguration of multiple tumors are multiple. Multiple recurrence was also noted in one patient with primary single tumor. A second recurrence was observed in but two patients and the primary tumor was multiple in both. Repeated recurrences usually occur with multiple primary tumors.

Of the remaining 17 patients who were not re-examined, 5 were reported as symptomatically well, and no subsequent data were available from 12. Of the patients reported well, the period following the last treatment was as follows: 1, six and one-half years; 1, six years; 1, five years; 1, two and one-half years; 1, two years. Of the 12 patients without subsequent report, 8 were fulgured within the past year. While it is difficult to draw exact conclusions as to recurrences from this group without having made a cystoscopic re-examination, nevertheless it is significant that 5 patients are reported alive and well from two to six years after fulguration. It is also of interest that there remain but 4 patients who have not been heard from. It is fair to assume that the majority of these are still living.

Of the 9 patients with papilloma of doubtful malignancy, 4 were fulgured without success and, later, resection was done. Of the remaining 5, 1 was well two years, and 1 six months afterward, 1 had multiple recurrences annually, 1 showed extensive recurrence five months later, and 1 was treated three months previously. An interesting occurrence was that of two tumors in the same bladder; one was relatively benign and was readily removed by fulguration; the other was not affected by fulguration and on resection later, was found to be malignant. It is evident that although a few cases of malignant papilloma will respond to fulguration, the majority will not.

Of the 13 patients with carcinoma, in 9 the treatment was given for recurrences following suprapubic resection for carcinoma. In 4 patients the tumors were of a doubtful nature on clinical examination, but did not respond readily to fulguration and were operated on later. Of the 9 patients that were fulgured following operation, 1 was fulgured after fifteen months and has been well for two years, 1 was fulgured after two years and has been well four years, 1 was fulgured after eighteen months, and in a letter from the patient three years later he states that he is well, 1 was fulgured after three years and has not been seen for three months, 1 has been fulgured yearly for the past three years for recurrences and was last examined five months ago, and 1 was fulgured three months after operation and has not been examined for three months. Three of the patients have died from one to two years after operation. It will be noted that the period of freedom from recurrence was much longer after fulguration than after operation. The time of recurrence following fulguration was more than a year in all but two patients, and much longer than that observed with relatively benign papilloma. Tumors which have been frankly malignant at operation will frequently respond to fulguration when they recur. The degree of malignancy is evidently reduced with successive recurrence, and even though the patient may not be cured, life is unquestionably prolonged.

In the 9 cases of recurrence in this group, 5 were at the previous site of the tumor and 4 were at different sites. In 3 cases the recurrence was multiple, and in 3 single. Cystoscopic examination several months after resection for a malignant tumor will occasionally reveal evident proliferation of the mucosa at the site of the previous incision. There may be no evidence of other involvement of the external wound, but this proliferation may persist and remain stationary for many months. It is advisable, however, to give it a thorough course of fulguration and radium exposure.

In the 7 cases of questionable papilloma, the time since the last fulguration is as follows: 1, six years; 1, five years; 1, four years; 1, three years; 2, one and one-half years; and 1, less than a year. None of these patients have been

re-examined, but letters received from them indicate that there is no recurrence.

Papillomatous proliferation of the mucosa to a slight degree, the exact nature of which it is difficult to determine, is sometimes visible in the bladder. Such tumors are found more often near the ureteral meatuses or the internal vesical sphincter, and although they are probably the result of a slight chronic inflammatory reaction of the mucosa, no other evidence of inflammation may be visible. They may disappear spontaneously but they will occasionally remain stationary in size for a period of several years. It is quite possible that some of these are the forerunners of papillomas or malignant tumors, which is further suggested by the frequency with which malignant tumors are found near the ureteral meatuses. Such tumors when discovered should be removed at once by fulguration.

Severe chronic inflammation will occasionally cause such extensive proliferation of the mucosa that it may simulate a true bladder-tumor. This is particularly true with vesical tuberculosis. Microscopic examination of the tissue in question, or catheterization of the kidneys, would usually identify the lesion. The specimen obtained, however, may be unsatisfactory and renal catheterization may be impossible, thus making identification of the tumor exceedingly difficult.

The number of treatments necessary to remove tumors is not always in ratio to their size. Occasionally, tumors of considerable size are removed in one fulguration, whereas much smaller ones may require several treatments. It would seem that the rapidity with which the tumors disappear is in a measure in proportion to the degree of malignancy. The treatment of large tumors may be hastened by the preliminary removal of much of the tissue by means of a snare as suggested by Buerger.

Following the removal of a papilloma by fulguration there will usually be considerable inflammatory reaction in the mucosa, and consequent edema and granulation tissue may simulate a persistent remnant of the papilloma. This, however, will gradually disappear spontaneously in the course of three or four weeks. Occasionally, the bladder-mucosa at the site of the suprapubic incision remains congested and irregularly infiltrated for a long time following

fulguration, and such congestion when persistent is frequently indicative of underlying malignancy. Thorough fulguration of the area should be tried, and if the congestion still remains radium should be used.

Radium. Since radium has been used with such good results in treating superficial malignant conditions, such as in the skin, larynx, etc., it would be reasonable to expect similar results in the bladder. Thus far, however, the experiences reported have not been encouraging. Geraghty believes that it is of little or no value in the treatment of frankly malignant tumors of the bladder. His method of application consisted of hourly exposures with 100 mg. of radium, screened by a brass capsule of 3 m. m. in thickness, which is applied directly over the tumor by rigid instruments within the bladder. He reports a series of papillomatous tumors, however, that did not respond to fulguration until they had been exposed to radium. After this they were readily removed by fulguration. Barringer, on the other hand, reported evident cures with radium alone in 3 of 9 cases of inoperable malignant tumors. His technic differs from that of Geraghty in that the unshielded original lead capsule of radium is inserted in the bladder and the patient placed in a position to bring the capsule in contact with the tumor. It is further allowed to remain in the bladder for a much longer time, namely, five or six hours. Kolischer* reported successful removal of several malignant tumors with the use of mesothorium. He employs this intravesically, leaving the capsule in the bladder as long as 24 hours.

Our experience with radium has been largely as an aid to post-operative and preoperative treatment. Following resection of malignant tumors, it has been our custom to leave the unshielded radium capsule in the bladder for several hours in the hope of destroying any superficial malignant cells remaining. In preoperative and inoperable conditions it has been found valuable in reducing infection and cleaning up foul-smelling urine. In cases of persistent bleeding from the tumor a few hours of exposure to radium will often control it. This, together with deep X-ray exposure, is occasion-

*Kolischer—Radiotherapy and diathermy in malignant tumors of the bladder. Urol. and Cutaneous Rev., 1916, XX, 66-67.

ally of value in controlling pain sometimes found in inoperable cases. In two cases in which there was secondary recurrence of papillary carcinoma, the tumor disappeared following long intravesical application of 100 mg. of radium. In 3 cases of secondary recurrence of the tumor in the suprapubic wound following resection, the nodules were softened and to all appearances the process was temporarily controlled. It may be said, therefore, that although radium does not have the brilliant therapeutic results of fulguration in the treatment of bladder-tumors, it is, nevertheless, a valuable adjunct when the condition is malignant.

In summarizing our experiences with the non-operative treatment of tumors of the bladder, it may be said:

1. Fulguration offers a safe and comparatively easy method of removing bladder papillomas.

2. Fulguration is applicable only to the papillomatous tumors of a relatively benign type.

3. Although the ultimate results following fulguration are much superior to those following suprapubic resection, the method does not always offer a permanent cure.

4. The degree of malignancy is usually readily ascertained by the cystoscopic appearance and clinical data.

5. In doubtful cases the degree of malignancy is best ascertained by its reaction to fulguration.

6. The percentage of recurrence of papillomas in a series of 33 cases repeatedly re-examined was 27.

7. Recurrence when present usually occurs within six months after fulguration and is generally at the site of the primary tumor.

8. Multiple recurrence is more often observed with multiple primary tumors.

9. Tumors which have been frankly malignant at operation will frequently respond to fulguration when they recur.

10. The degree of malignancy is evidently reduced by successive recurrences.

11. Small papillomas, usually situated near ureteral meatuses, are occasionally accidentally discovered. While some are inflammatory, others are forerunners of large papillomas and should be fulgurated.

12. Radium is of value (1) as a prophylactic measure following surgical resection of bladder-tumors, (2) to control hematuria and pain, (3) occasionally in removal of malignant tumors, particularly when recurring.

DISCUSSION.

DR. OSCAR OWRE, Minneapolis: There has been a great deal written and a great deal said about tumors of the bladder in the last five or six years, and fulguration in the treatment of bladder tumors has probably made as great an advance in genito-urinary work as any since the advent of the cystoscope. Dr. Braasch is certainly well qualified to speak on the subject, and I think we should consider his conclusions seriously. When he says that microscopic analysis is often superfluous and unnecessary, he voices the actual clinical experience of a great many of the leaders in this country. I am reminded in this connection of one of Dr. Keyes' terse statements when he said that a competent pathologist pronounced the original papilloma of the bladder from a section as benign, and when there was a recurrence of the growth and the pathologist was confronted with this statement, he stood firmly by his diagnosis. A section of the bladder is often difficult to analyze microscopically, the same as a section from a gumma is difficult to analyze, on account of the peculiar type of tissue, the heaping up of epithelial cells, and unquestionably the cystoscopic evidence is more important than the microscopic evidence. There are, however, some very important exceptions to this rule from a clinical standpoint, and among them this: a single papilloma of the bladder in a young individual would probably be benign, but should be looked upon as potentially malignant, as Dr. Braasch has said, while a single papilloma of the same type in an individual past 40 or 50 should be looked upon not as benign but should be considered malignant. Many papillomata in persons of middle age arise from an infiltrating carcinoma beneath the mucosa which sometimes cannot be appreciated by the cystoscopic appearance. Carcinoma in a young individual is unquestionably very grave. My youngest case was a young man, 24 years of age, who died in six months. Cystoscopic evidence was furnished by the first attack of hematuria.

I think Dr. Braasch talks to the point when he says that we should substantiate our diagnosis when we can by vaginal and rectal examinations, and there I might add bimanual examination. I have had this clearly demonstrated in consultation with Dr. Abbott recently, in which he demonstrated bimanual examination through the rectum which we could not appreciate nearly so well through the cystoscope. It would be desirable to have an accurate picture of the pathological nature of the growth in addition to the cystoscopic picture. We should bear in mind that while we may seemingly successfully remove a be-

nign growth, death may occur from metastases in other parts of the body, while the bladder may remain free from all recurrence of the tumor.

There are some important contraindications to the fulguration method, and that is, if the growth is large and of rather firm texture, fulguration is not successful. If there is an intractable cystitis, the fulguration method is certainly contraindicated. If the tumors are sloughing or are ulcerating, it is sometimes difficult to make any progress with fulguration. Also the multiplicity and size of the tumors must be considered. We cannot always tell whether a tumor will yield to fulguration or not, and yet some good men have said that malignant tumors will yield to fulguration. I am strongly reminded of a case of tumor of the bladder which was pronounced by microscopic section to be malignant. A part of the growth was removed by the cystoscope in which the doctor tried fulguration, and it did not progress. The doctor told Dr. Geraghty about it, and he tried more fulguration, the growth receded and disappeared, and it remained so for some years. The malignancy in this case was corroborated by Dr. Geraghty.

I am not permitted within the scope of this discussion to say anything about the cutting operation, and the dangers of implantation from this method of procedure, but with an apology for diverging, I would like to quote one case that is particularly interesting, namely, a case that occurred in the practice of the late Dr. Millett of Rochester. This case was seen by Dr. Millett, and pronounced as a malignant growth near the neck of the bladder. The man was past 40 years of age, and operative procedures at that time were discarded. He had retired from business and awaited the inevitable, but gradually improved. He had hematuria and pain on urination, but at the end of eight years he was doing his work again; then he got a sudden attack of hematuria with pain on urination and was cystoscoped by me five years ago. At that time, the diagnosis of Dr. Millett was corroborated and the growth had filled the entire bladder. It was a large fimbriated papilloma with a gelatinous mass between the fimbriated process. A suprapubic section was done and the growth removed. We could not exercise any care because it was everywhere; it was scooped out, and I imagine it would fill a twelve-ounce receptacle. We found the base was as large as my thumb, the pedicle. This was curetted out and cauterized by actual cautery. I have examined this case off and on cystoscopically for 5 years, and there is still no recurrence. An interesting feature is that there are no implants following the operation, and yet it was microscopically malignant. I do believe the actual cautery has some place in the treatment of these tumors.

Speaking of fulguration again, I think those cases that we can observe for a long time prove to us what is good and what is not good. I recall the case of a woman who had the pyelitis of pregnancy. She had been cystoscoped three times, and the kidney was pronounced tuberculous because she had some sharp

attacks of profuse hematuria. On the fourth cystoscopy which I did I happened to see a papilloma with a good-sized pedicle on the opposite side of the bladder, and determined that the bleeding came from the papilloma. I fulgurated this and it disappeared with one treatment. I have examined this woman and she has had two pregnancies since then. I have examined her several times with the cystoscope over a period of four or five years, and there has been no recurrence. In this case fulguration was the method par excellence for the treatment.

As to relapse, and that is what counts in the treatment of tumors of the bladder, I am strongly reminded of a little incident that occurred in Minneapolis. A prominent physician, of good Scandinavian extraction, who was not a surgeon, attempted circumcision. He thought he could do a circumcision. One morning he stayed at the hospital watching a general surgeon doing a circumcision from start to finish, and at the conclusion of the operation he stepped up to the surgeon and said, "Doctor, I am very glad to have had the opportunity of seeing this operation; I have done a great many circumcisions, but I am sorry to admit that I have had a number of relapses." I am sure there must be some relapses from the papillomata of the bladder by the fulguration and other methods. If confronted with a papilloma of the bladder, I have wondered what I would do. I rather think I would take my chances on fulguration, then on top of that the expectant treatment.

DR. E. STARR JUDD, Rochester: I do not know that there is a great deal more to be said about the fulguration method of treatment of bladder tumors, but there are one or two points Dr. Braasch brought up I would like to emphasize, one of which is that when these tumors of the bladder do not respond promptly to continuous fulguration, they should be operated upon. I think some of the advanced cases that we have done radical operations upon were apparently good surgical cases to start with. If operated upon at the beginning, the tumors could have been removed satisfactorily, but instead, fulguration has been tried and failed.

Dr. Braasch mentioned one case that was fulgurated 20 times. In that case the condition was practically inoperable. The diagnosis, it seems to me, is the important thing from the standpoint of treatment.

I was thinking of two cases when Dr. Owre mentioned the case of Dr. Millett, one the case Dr. Millett had, and a second one seen a few months ago. This patient had been fulgurated and treated for bladder tumor many times, and apparently the bladder was still filled with the papillomatous growth very similar to the first case we had in Dr. Millett's hands. Dr. Braasch was unable to make a diagnosis with the cystoscope. The patient had a stricture of the ureter; I enlarged it. I cut out some tissue for diagnostic purposes and was not able to make a diagnosis, but after two or three months of drainage the bladder cleared up, and then Dr. Braasch was able to catheterize the ureter, and we got evidences of tu-

berculous infection from the right kidney. Recently I took out the right kidney of this patient. The case that Dr. Millett had, turned out to be tuberculosis as well. Where there is extensive involvement of the bladder by a papillomatous growth I think we may safely consider it to be tuberculous.

THE TREATMENT OF EPIDEMIC CEREBROSPINAL MENINGITIS.*

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The statistics of earlier epidemics have shown the fatal nature of this disease. Even in mild epidemics the mortality was high enough to class this as one of the most fatal of all diseases. Different methods of treatment followed one another in the past, based on the pathology known at those times. The antiphlogistic method of treatment in vogue at the date of the first recognition of the disease remains to some extent still in fashion.

This being physically a desperate disease, naturally drastic remedies were suggested. Venesection was always employed, also blistering the head, cupping and leeches. Mercury was pushed to salivation and emetics were used. In spite of these heroic measures the mortality was as high as ever.

At a later period, the administration of drugs and soothing remedies followed. The application of ice to the head or Leiter's Coil, opium to relieve the pain, and iodides to increase absorption, were much used. With this method of treatment the suffering of the patient was lessened and his strength husbanded; but the mortality was not much if any lower.

As evidence of the failure of old methods of treatment, the death rate was about 80 per cent. and even 90 per cent. In 1904 and 1905 the mortality in New York, according to Heiman and Feldstein, was 86 per cent. (at a time when the bacteriology and the pathology of this disease were known). In Boston, according to Dunn, the mortality was 70 per cent. in 1902; 90 per cent. in 1907. In Belfast in 1908 the mortality was 76 per cent. . Ker, in Edinburgh, re-

ported a mortality of 80 per cent. . This shows that up to this point in spite of the knowledge of pathology, no progress was made.

In 1905 Flexner and Jochman began to experiment with serums, and to Flexner must be given the credit for selecting the subdural route. The results they obtained are almost as important as those from the discovery of diphtheria antitoxin. Flexner reports 1,294 cases in 1913 with a mortality of about 30 per cent. (excluding cases dying within twenty-four hours after treatment, where we would be led to suppose that serum had not been given a fair trial).

Although Flexner's mortality was 30 per cent. in 1913, unfortunately the mortality in other places, especially in England, has not been so low under serum treatment. In the cases occurring in the Royal Naval Depots of England (1914-1915), the mortality of serum treated cases was 64 per cent; but many of these cases came late for treatment.

The report of the Medical Research Committee on cerebrospinal fever (1916) shows that the majority of the reporters seemed unable to determine how much benefit was derived from the serum and how much from the associated lumbar punctures. The average mortality seemed to be as high as 59 per cent. in serum treated cases.

In 1916 F. W. Andrews had 11 cases with a mortality of 36 1/3 per cent. . On the other hand, Gaskel and Foster in a series of 30 cases treated by puncture alone had a mortality of 30 per cent. .

The one fact upon which most observers seem to agree is that chemical substances employed, such as soamin, protargol and lysol, are of no value in influencing the course of this disease. Flexner and Amoss have shown that protargol and lysol have no effect on meningococci in guinea pigs and monkeys, and moreover, being antiphagocytic, do more harm than good. We must confess that a definite line of treatment for epidemic meningitis has as yet not been satisfactorily determined, as methods of considerable diversity are still employed by various observers. Some difference of opinion exists as to whether serum is or is not of any efficiency; whether cases are best treated by lumbar puncture alone, or if vaccines contribute to success.

*Read at the annual meeting of the Minnesota State Medical Association, St. Paul, Minn., Oct. 11 and 12, 1917.

All records of a number of consecutive cases treated by a particular method may be of some value in the ultimate decision as to the best method of combating the disease.

Recognition must be given to the fact that the symptom complex consists of (1) symptoms of sepsis, (2) symptoms of meningeal irritation, (3) symptoms of pressure. Therefore, each must in its turn receive due consideration in order to get the lowest mortality. We must determine in the treatment of meningitis in what stage the disease exists, whether it be the (1) catarrhal stage, (2) stage of sepsis, or the (3) stage of meningitis.

In the treatment of the catarrhal stage the routine to be advised would be the spraying of the nose and throat with antiseptic solutions, preferably hydrogen dioxide. This should be combined with the intramuscular injection of serum. In the septicemic stage it must be borne in mind that we have a condition of meningococcal sepsis which can be diagnosed during an epidemic. Here, large doses of serum intravenously or intramuscularly are curative and abortive in results. In the treatment of the meningeal stage one must consider that the symptoms are due to sepsis, pressure and also meningeal irritation.

In our series of 49 cases, from February 16th to August 2, 1917, we tried to fit our cases into the above grouping, and always to bear those three stages in mind.

On admission we made a spinal puncture and administered serum. If septic we always gave serum intramuscularly every day to counteract this condition; always administering the serum warm, giving less serum than the fluid removed (otherwise we would not relieve the pressure), never giving less than four doses of serum subdurally; and as a rule repeating the serum injections until we obtained two specimens of spinal fluid free from bacteria. We found the latter to be a better index of the results of our therapy than the appearance of the spinal fluid or the physical symptoms.

We drained off all the fluid that would flow until normal pressure was secured, paying no attention to the rapidity with which the fluid escaped. We found in a series of 473 punctures that no bad results followed. Foster reports 300 successive punctures under like con-

ditions without unpleasant symptoms. We believe the central route the one of choice in spinal puncture in both adults and children on account of simplicity of technique. We were unusually fortunate in this series of punctures in that no mixed infections in the spinal canal resulted. We were aided, probably, by the resistance of this locality to infection.

Of the two methods of administering serum intraspinaly—the syringe method and the gravity method—we preferred the latter on account of its being safer and more easily controlled. We always administer the serum slowly, and warmed to body temperature. In only three instances did complicating symptoms arise.

After the stage of administration of serum had passed we continued puncturing the spinal canal at intervals, to relieve the pressure and to prevent symptoms of hydrocephalus. We believed this to be better than waiting for such symptoms to develop and then treating them. As a result of this course we had only two cases in our series which showed any evidence of hydrocephalus.

Accidents sometimes follow the subdural injections of serum, among them being the breaking of the needle, which is rarely mentioned under this heading but which does occur. In such a case, authorities agree that the procedure should be the same as with a foreign body elsewhere, namely, to leave it alone unless symptoms develop. Accidents are reported following the rapid removal of fluid from the canal. Possibly this danger is over-emphasized. In our experience no bad effects were met with no matter how rapid the rate of flow. In administering serum great care must be taken. It must first be given warm, next very slowly or considerable pain and severe symptoms will be met with. Whether this is due to the introduction of foreign substance into the canal or to sudden increase in pressure has not been determined. In our series we encountered difficulty in three patients during the administering of serum, with one fatal result. In the other two cases the symptoms of nystagmus, pallor, and shallow respiration, followed by cardiac disturbances, were overcome by oxygen and mechanical respiration. In endeavoring to ascertain if pressure was the cause of these symp-

toms, we observed that no phenomena occurred in one of these cases when normal saline was injected in the place of serum.

The statistical summary of our series is as follows:

We had 49 cases, with 19 deaths and 30 recoveries. This makes our crude death rate 38.7 per cent. and our recovery rate 61.2 per cent. There were two cases on whom we did not use serum, the patients being moribund when first seen. Thus, out of 47 cases treated with serum, we had 17 deaths and 30 recoveries, or a death rate of 36 per cent. and a recovery rate of 64 per cent. If we exclude two other cases which died inside of twenty-four hours, where serum probably was not given a fair chance, we had 45 cases remaining. Of these, 15 died and 30 recovered, or a death rate of 33 per cent., and recovery rate of 66 per cent.

This last conclusion is similar to the report as given by Dr. Simon Flexner in his review of over 1,200 cases in which he had a mortality of 30 per cent.

The most encouraging part of the serum treatment is the absence of unpleasant permanent sequellae, although while under treatment we had three cases of central deafness, one case of ptosis, five cases of strabismus, and two cases of hydrocephalus. None of them left permanent results and have not recurred. Of this we are fairly confident, as we tried to keep these patients under observation for a few months after leaving the hospital. This is a much lower percentage and is in marked contrast to the older forms of treatment when so many were left crippled mentally and physically. In our series we had only one case of chronic meningitis, a patient who died later from a complication of pharyngeal diphtheria.

A few words must be said of the prophylactic treatment. Systematic prophylaxis against epidemic meningitis consists in active treatment of carriers during the epidemic. These carriers may be healthy or sick. The subject of carriers is very important, especially in military life, as is shown in a case reported by Settle in 1910 where a man who had been infected three months before, returned to his regiment with meningococci still in his throat. Seven days after his arrival, ten out of thirty men in his part of the barracks were found to be carriers.

The treatment of carriers should be: (1) quarantine; (2) medical, (a) local (b) internal treatment; (3) specific treatment, (a) serum prophylaxis, (b) active vaccination.

(1). Quarantine is the most important step. An arbitrary quarantine time cannot be established. The carrier should be controlled in a manner similar to that used in diphtheria, that is, not released until the cultures of the nose and throat are negative. The house should then be disinfected.

(2). Medical treatment consists in local and internal treatment. (a) Bethge reports best results with nasopharyngeal sprays of normal saline followed by peroxide. Sophian used saline followed by a one-half per cent. peroxide in the Dallas epidemic, with good results. Most patients become negative in a few days, never more than ten days.

(b) Internal Treatment. Urotropin may be of benefit. Flexner found that preliminary use of this drug afforded protection against inoculation with poliomyelitis. This drug was used by Sophian in an epidemic in 1912 in the Southwest in conjunction with the local treatment.

(3). Specific Treatment. This produces a specific immunity. It can be produced by injecting serum, causing a passive immunity, and by vaccines, causing active immunity.

(a) Passive Immunization. This is produced similarly to that in diphtheria. This was recommended as early as 1906 by Joekman. The average dose is 10 cc. of serum and is especially to be used in an epidemic in immunizing nurses and physicians. This was tried by Sophian in the 1912 Texas epidemic, many nurses and doctors being inoculated, and in no case did the disease develop under this method. The objections to passive immunization are, (1) the immunity lasts only temporarily, probably only a few weeks, (2) serum sickness, (3) danger of future anaphylaxis, should a patient get the disease and require serum.

(b) Active Immunization. Active immunity by vaccines has been tried in many cases by Sophian, no one contracting the disease afterwards. We must remember that only a little protection is needed, as the organism is of low virulence. The vaccine should be made from mixed cultures of the organism of the existing epidemic.

Conclusions.

All the older forms of treatment did not in any way lower the death rate or diminish the terrible sequellae. Our only hope is in the serum treatment.

The benefit derived from this method is partly due to the drainage and partly to the serum. If no reliable serum is available, simple repeated punctures and drainage should be used.

Under the serum treatment the course of the disease is shortened, the death rate is lowered, and the unpleasant sequellae and cases of chronic meningitis are almost eliminated.

DISCUSSION.

DR. J. J. McGROARTY, Easton, Minn.: Mr. President, Ladies and Gentlemen: I think we ought to be thankful that we had such a fine symposium on meningitis here this afternoon.

In my series of 18 cases, I found that the time the case comes under observation aids greatly in making a diagnosis.

There is one symptom I would like to lay much stress upon, and that is the pulse rate. Early in the disease, whatever form of meningitis you may have, or whatever germ you may find in the spinal fluid, you have a slow pulse the first day or two of the disease. So then, if you find a child suddenly taken ill with fever, severe headache, vomiting, and all the symptoms of an acute illness, with a slow pulse, it should be your duty to do a lumbar puncture. In this series of cases I found that the pulse was slow the first few days of the disease. The behaviour of the pulse is characteristic. In the early stage it is disproportionately slow. Later on the pulse in meningitis increases in rate, so that at the end of five days or a week it is commonly above 100 and just before death there is a very marked acceleration of the pulse.

In the early stage of the disease, during the period of muscular irritability, rigidity and hypertonus, there is also a marked irritability of the cardiac pneumogastric inhibitory fibers. This is shown by the fact that the pulse rate often runs as low as 50. This very slow pulse, in other words, is due to irritation (i. e., stimulation) of the cardiac inhibitory center in the floor of the fourth ventricle, either because of direct

pressure upon it from the increased pressure in the cerebrospinal fluid, or because of irritation by the toxins upon the cardiac inhibitory center. There is at any rate in the early stage a marked irritability of these cardiac fibers, and the result of the increased irritation is a marked slowing of the pulse.

The acceleration of the pulse marks the stages in which the irritation of that center is passing over into the stages of complete paralysis of that apparatus. Therefore, death in practically all the cases of cerebrospinal fever is primarily due to a paralysis of the cardiac inhibitory fibers with secondary paralysis of respiration.

When you suspect the affection to be meningitis, you should have the temperature, pulse and respiration taken every two hours by a well trained nurse, because the pulse and temperature are very variable and this record carries with it the diagnosis. For example, at 2 P. M. the pulse may be 80; at 4 P. M. 66; at 6 P. M. 72; at 8 P. M. 50, and at 10 P. M. 86.

There is only one acute condition which can cause such a peculiar relationship between pulse rate and temperature, and such a peculiar oscillation of pulse rate and temperature, and that disease is meningitis, whether of the tuberculous, epidemic, pneumococcic, or any other variety.

The earlier we make our diagnosis, the quicker we can give our serum, and, as a result, I believe we will cure more cases.

DR. T. L. BIRNBERG, St. Paul: There are two points which I would like to bring out from my personal experience, which may be of value to others. According to the books the bulging of the fontanelles is of value. In actual practice it does not work. We have found that two of our infants did not have the bulging fontanelles, but did have a depressed fontanelle. I said that it was not meningitis, but the postmortem findings convinced me that the books and myself were wrong, and that the patient did have meningitis.

The slow pulse also is not of value in the diagnosis of meningitis, although emphasized as such by most authorities. It is only a sign of pressure and the diagnosis should be made before much pressure exists by means of exploratory spinal puncture. This slow pulse was characteristically absent in our series of cases due to the fact that we laid great emphasis on the relief of pressure being imperative to proper therapy, both during the acute stage and during early convalescence.

ABSOLUTELY NECESSARY MICROSCOPIC DIAGNOSIS.*

WM. CARPENTER MACCARTY, M. D.,
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The role which expert microscopic diagnosis plays, and should play, in the practice of the science of medicine can best be appreciated by a study of figures.

The subject may well be treated from three standpoints, each of which possesses practical and important significance, not only from a diagnostic standpoint, but from a standpoint of justice and efficiency rendered the general public.

The day of dressed diagnosis and prescription therapy has given way to accurate physical examination and therapy which knows nothing but the rendition of the most efficient service to the patient, regardless of types of therapy.

The relation of the expert microscopist to this service may be divided into the following three groups of activities from a diagnostic standpoint:

1. Confirmation of clinical diagnosis.
2. Correction of clinical diagnosis.
3. Clinical diagnosis.

In so far as pathologic tissues are concerned, each may be seen in the accompanying tables.

There are three points of observation, i. e., the clinical, surgical, and pathological, each of which serves as a means of reckoning the duty which the medical profession owes his clientele.

I.

From a Clinical Standpoint.

Total No. of cases registered July, 1917.	4,752	
Total No. of operations.....	1,699	=35 %
Total No. of surgical specimens.....	1,046	=22 %
Total No. of specimens removed for diagnosis	179	= 3½ %
Total No. of necessary microscopic diagnoses	208	= 4.3 %
Percentage of operation cases.....		=35 %
Percentage of operative cases producing surgical specimens.....		=22 %
Percentage of operative cases producing specimens for diagnosis.....		= 3½ %
Percentage of operative cases which need microscopic diagnoses.....		= 4.3 %

It may be seen that out of all patients who come to examination, regardless of the physical ailment, 3½ per cent cannot be diagnosticated clinically, in so far as tissues are concerned, without the aid of the expert tissue microscopist, and that 22 per cent of all patients possess definite pathologic tissues which can, and probably should be, removed.

The question of how many patients possess lesions which must be diagnosed microscopically—bacteriological, blood and tissue examinations excepted—can be answered by saying that 4.3 per cent of all patients present tissues which of necessity require microscopic diagnosis. These figures are of greatest importance in showing the inefficiency of hospital and private practice which is carried on without the aid of expert tissue microscopy.

II.

From a Surgical Standpoint.

Total No. of cases registered July, 1917.....	4,752
Total No. of operations.....	1,699
Total No. of surgical specimens.....	1,046
Total No. of specimens removed for diagnosis.	179
Total No. of necessary microscopic diagnoses.	208
Percentage of operations which yield specimens	61%
Percentage of operations which need microscopic diagnoses	12%

In the second table there is food for thought for the operator who works without the aid of immediate expert tissue microscopy. It may be seen that 61 per cent of all operations yield surgical specimens and that 12 per cent of all operations require the assistance of tissue microscopy.

III.

From a Pathological Standpoint.

Total No. of cases registered July, 1917.....	4,752
Total No. of operations.....	1,699
Total No. of surgical specimens.....	1,046
Total No. of necessary microscopic diagnoses.	208
Total No. of specimens removed for diagnosis.	179
Total No. of specimens removed for diagnosis needing microscopic diagnosis.....	149
Percentage of surgical specimens which need microscopic diagnosis	19.8%
Percentage of diagnostic specimens which need microscopic diagnosis	83 %

In the third table the so-called "gross pathologist" may see his limitations in so far as his aid to surgical and clinical procedure is concerned.

*Presented before the Southern Minnesota Medical Association, Mankato, Minn., Nov. 27, 1917

Of 1,046 surgical specimens, it was absolutely necessary to resort to the microscope in 19.8 per cent, which is practically one out of every five. If such organs as the appendix, gall-bladder and ovary, all of which rarely need a microscopic diagnosis, be excluded in reckoning the percentage, it may be seen that the necessity of microscopic diagnosis jumps up to 28 per cent.

IV.

Percentage Reckoned Without Appendices, Gall-bladders and Ovaries.

Total No. of surgical specimens.....	1,046
Total No. of appendices, gall-bladders and ovaries	321
Total No. of surgical specimens minus appendices, gall-bladders and ovaries.....	725
Total No. of necessary microscopical diagnoses	207
Percentage of necessary microscopical diagnoses	28%

That there is a great organic variability of the necessity for such precision may be seen in the following table:

V.

Necessary Microscopic Diagnoses in Organs and Anatomical Regions.

	Total No.	No. Mic.
APPENDIX	181	0
BREAST	29	5= 17%
EXTREMITIES	13	7= 5%
GALL BLADDER	84	0
GENITO-URINARY SYSTEM	53	7= 13%
Bladder	3	0
Epididymus	2	0
Kidney	20	5= 25%
Prostate	20	1= 5%
Recto vaginal septum.....	1	0
Seminal vesicles	3	1= 33%
Testicle	2	0
Vas deferens	2	0
HEAD	7	2= 28%
Cheek (Tumor)	1	0
Jaw (Tissue)	1	1=100%
Lip (Epithelioma)	2	0
Scalp	3	1= 33%
INTESTINES'	28	13= 46%
Colon	3	2= 66%
Duodenum	3	0
Intestine (large)	1	0
Rectum	15	9= 60%
Recto-sigmoid	2	0
Sigmoid	4	2= 50%
LIP AND GLANDS	3	3=100%
NECK	34	11= 32%
Glands	22	7= 31%

Parotid (tumor).....	6	2= 33%
Tissue or tumor.....	5	2= 40%
STOMACH	14	10= 71%
THYROID	175	3=1.7 %
TRUNK	11	4= 36%
Larynx	1	0
UTERUS, TUBES AND OVARIES. 17		3= 17%
UTERUS	52	5= 9%
TUBES	48	4= 8%
OVARIES	56	1=1.7 %
COLONIAL LABORATORY.....	161	64= 39%
OFFICE (SPEC. FOR EXAMINATION)	46	46=100%
HOSPITAL (SPEC. FOR EXAMINATION)	34	20= 58%

The figures shown in the accompanying tables clearly show the necessity of intimate affiliation of the tissue pathologist with both the clinician and the surgeon.

It must be remembered that these figures represent activity carried on by men who have been especially trained by a large experience which has been obtained by whole-time devotion to their subject. They are not figures which might obtain in the hands of interne pathologists, individuals who do pathology as a side-line, or by professors who teach the subjects of immunology, serology, bacteriology and postmortem pathology, all under the subject of pathology, but by men who do nothing but study fresh tissues in their relation to clinical medicine.

It may not be out of place at this time to state a few facts relative to other branches of clinical microscopy, each of which is conducted by specialists. During the same month during which 4,752 patients were examined, there were 4,825 examinations of urine, 2,000 examinations of blood, 250 stool examinations, 165 sputum examinations, and 258 miscellaneous examinations, all of which were microscopic, and all of which were necessary, either from the positive or negative standpoint.

In summing up these figures, it may be stated from the standpoint of the clinical microscopist in all branches that it was necessary to make 7,706 microscopic diagnoses, all of which positively or negatively affected the diagnosis and prognosis of the patients.

There seems to be one conclusion to be drawn from these facts, namely: The practice of medicine to occupy a place in science and to render justice to the patient who places faith

in the sincerity and accuracy of the profession, cannot be justly and efficiently carried out without the assistance of expert or specialized microscopy as practiced in the various specialties.

DISCUSSION.

DR. S. MARX WHITE, Minneapolis: Mr. President, Members of the Society: Of course, Dr. MacCarty had time only to sketch a very rough outline of the things he desired to present. Having been interested both in the laboratory and in the clinical field, I have gotten to feel that the microscope is simply one means of extending the field of our senses; that the microscope gives to the eye impressions of objects that are too minute to get by other means, and we must not forget that relationship. The microscope gives only an extension of our field. That thought constantly impresses itself upon me. I feel that with the microscope as with the field of vision, other senses must be brought into play, and we must correlate our knowledge gotten from other sources with that gotten from the laboratory.

Unquestionably Dr. MacCarty in his work presented here realizes that clinical data can be correlated with the microscopical data very advantageously. I feel, however, that no man in clinical work has any right to relax his vigilance with the microscope; that the pathologist and the clinician must work together, and the clinician must keep his eye, so to speak, on the laboratory. Dr. MacCarty shows a large number of cases in which the microscope is of major importance, and he has given us the correct impression.

He complains about the scarcity of laboratory men. The basis on which he makes his complaint is probably not well taken, because in the directory of the American Medical Association, for instance, a man is prevented from listing more than one specialty. There are a good many men who are doing a good deal of laboratory work although not limiting themselves absolutely to that field, who in this directory will emphasize the clinical field. That is one reason for the apparent scarcity of laboratory men.

Another reason is that the laboratory man, the pathologist, has gone out of the laboratory in which the compensation for men is inadequate. I know the feeling on the part of a good many clinicians is that the laboratory man, if he is paid a moderate salary, is sufficiently paid. Only yesterday in talking with a clinical man, the idea was brought out by him that the scale of living for the laboratory man and the clinician is different, the clinician needs more money, the clinician lives on a different scale, he has to entertain more, he has to go farther afield to get the things of importance. I do not believe that. I feel that the scarcity of whole-time laboratory men is principally and largely due to the inadequate compensation given to those men, and that as clinicians we look upon a small fee for laboratory service as a

sort of unnecessary expenditure. I think the reason is that we do not correlate our work with that of laboratory men. We ought to be willing to pay the men who are doing that work very much more than we are now willing to see them get.

DR. R. E. FARR, Minneapolis, Minn.: From the remarks of Dr. MacCarty concerning the pathologist I gained the impression that more time may be necessary than some of us have been led to believe, to prepare a man to do this kind of work. That phase of the matter is of much interest to those of us whose clinics are not large enough to control the services of one or more pathologists. In a city the size of Mankato, for instance, there must be one or two pathologists, and perhaps it is difficult to support them. In Minneapolis, we can depend upon the trained pathologists at the University, but there is more or less difficulty in commanding these men just when frozen sections, etc., are required. If a man has a small private hospital, he may be unable to control a pathologist as others may want this service at the particular time he does.

I have lately associated with a man who has not graduated in medicine, he is only a junior at the University Medical School, but has his degrees in science and has been in the laboratory for many years. For the past two years he has been doing the pathologic work of a fairly large, well-equipped hospital. Before taking him into my clinic I was assured by the teachers at the University that this man is perfectly competent to furnish me the laboratory assistance required in these cases, but I would judge that Dr. MacCarty would put him in the class he refers to as assistants, or internes. I would like to know if the doctor would consider it safe to rely upon the findings of such a man in this work. This is important to all of us who cannot control experienced and highly specialized pathologists, and the only practical solution of the problem, it seems to me, is that Dr. MacCarty suggests,—have more laboratory men. These men do receive relatively small compensation, but, with the exception of the few who become expert pathologists and teachers, most of the men in the cities who are working in the laboratories use pathology merely as a stepping stone to clinical medicine. Dr. Marx White did that,—he taught pathology some time ago, and the same plan is being followed by Dr. Drake, of Minneapolis, whom I consider an excellent pathologist. In that way they do receive requisite compensation as it is perhaps the best possible groundwork for the study of clinical medicine, but this state of affairs does not tend to furnish the number of trained pathologists necessary for our surgical clinics.

DR. MacCARTY (Closing): No one realizes the difficulty of the practitioner any more than I do, but in carrying out this reform in the medical profession I must exaggerate in order to make the profession get my point. I should encourage Doctor Farr to keep the young man, and send him away and keep him well posted on the latest methods of pathology

and give him larger experience in every way, but not to consider him an expert pathologist. We cannot all have expert pathologists around, but we have been satisfied many times to take the opinion that was not expert and call it expert. I would say that the man who has not graduated from medicine is not going to give efficient service. I have been looking through the microscope ever since I was 12. I made celloidin sections when 12, and have added frozen sections, etc., to it. I have devoted my entire life to my pathology. I have devoted my entire life from the standpoint of the clinician, and I think the pathologist who is going to be of service to the clinician must have clinical knowledge, just as we have clinicians practicing microscopy. The pathologist who is not a clinician is not a good pathologist. The clinician who is not a pathologist is not a good clinician. I know this from practical experience. I have my work checked up by the clinicians and they come to me and tell me when I make a mistake, but they must come to me in the spirit of a consultation between clinician and pathologist. We must be consultants together.

The pathologist must not go off in some corner and look over sections but must have his laboratory near the patients and co-operate with the physicians and surgeon. A man who has not had prolonged experience will lead you into error, but that does not mean that he cannot do good work. You should encourage this young man, but do not consider him an expert pathologist when he is not. I must say I write more question marks today in my diagnoses than I ever have before. I shall write more question marks as I grow older. I am just beginning to see things in pathology after years and years of experience. One is the necessity of standardization of the pathologic conditions to clinical facts. The pathologist has not done it. He has been off in a laboratory in one corner of the block, has not seen the patient and has not paralleled the clinical facts with the pathologic facts. It is part of the propaganda which I am trying to carry out, not only to give these figures, but to also standardize pathologic conditions with the clinical conditions. It has to be done by somebody if we are to have efficient practice of medicine.

One thing more, every man in the practice of medicine must recognize the necessity of the pathologist. We have our surgical assistants work one day per week in the laboratory, not to make them expert pathologists, but to show them the relation between expert pathology and the work they are doing; and so it is with the practitioner in the field—we have to have him, although he cannot always be an expert; he can call in, however, the expert pathologist occasionally as consultant, just as he calls the clinician and surgeon. The solution of the problem has been found in a small town in Iowa where the County Society has employed an expert pathologist at \$3,000 a year; he charges for each examination, extra. He is satisfied with the work, is doing the work well, is a recognized general pathologist, and is giving efficient service to every practitioner in the county who wants it.

THE PHYSIOLOGY OF THE CORPUS LUTEUM.

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In the consideration of the function of any organ, a brief presentation of its anatomy and development aids greatly in comprehending the activity of the structure in question. Therefore, the following paper is divided into three parts, namely:

- I. Anatomy,
- II. Development,
- III. Function.

I. *Anatomy of the Corpus Luteum.*

The emptied ovarian follicle, after ovulation, forms the basis of the corpus luteum. If pregnancy intervenes following ovulation, the corpus luteum attains great development, being known as the corpus luteum verus, to distinguish it from the corpus luteum spurium, which occurs when there is no pregnancy. This structure matured, consists of a number of large, irregularly polygonal cells, containing a yellow fatty pigment, a lipid. These cells are arranged in trabeculae converging toward the center of the follicle, being accompanied by sinus-like blood vessels, numerous in amount and rich in supply of blood. The size of the corpus luteum, the character of the cells, and the blood supply, vary with different stages of its development. The adult luteal cell is mono or multi-nucleated and contains a homogeneous protoplasm that is yellow in color, due to its lipid contents. The degenerating organ shows cells in which vacuolization has taken place, as well as a certain amount of fatty change.

Microscopically, the corpus luteum at the height of its development is from 1.5 to 3 centimeters in diameter, large and yellow. The early stage is well described by Novak: "Just after rupture of the graafian follicle, the corpus luteum is usually a small, collapsed structure, with thin moderately undulating walls, which are of grayish yellow hue instead of the brilliant yellow color of the later stages." Correspondingly, the atrophic corpus luteum is simply a mass of scar tissue.

II. *Development of the Corpus Luteum.*

The interesting point in the development of the corpus luteum centers around the place of origin of the luteal cell, and at present there are two main views each supported by a number of investigators.

The older view regards the luteal cell as a derivative from the theca cells, i. e., really of connective tissue origin. The more recent view contends that these cells are derived from the epithelial cells of the granulosa. The function of the luteal cells favors an origin from epithelial cells as, being derived from a more highly differentiated cell, one might by analogy more easily explain its modified function. Specialized function is more easily granted a cell of epithelial origin than it is to one of connective tissue origin.

The older view is described by Schafer in his monograph, *The Endocrine Organs*. He says in part: "The larger follicles become gradually more distended with liquor folliculi, and ultimately split open at the thinnest and most prominent part. When the follicle bursts, the ovum and discus proligerus escape and the rest of the follicular epithelium also becomes detached from the follicular wall and extruded or disintegrated. The cavity of the follicle is now usually occupied by a blood clot, derived from vessels at the point of rupture of the follicle. The enlarged cells in the wall of theca multiply and grow into the cavity, displacing the clot towards the hilum of the follicle. The cells are now known as luteal cells." Again he says: "From the above account, which is based upon observations in the rabbit and corresponds with that originally furnished by Von Baer, since confirmed by many histologists, it seems clear that the corpus luteum is developed entirely from the theca cells of the burst follicle; these cells are themselves derived from stroma cells, so that the follicular epithelium takes no part in the formation of the corpus luteum."

The more recent view is championed by Noel Paton. He states that "the old view that a hemorrhage occurred into the follicle, and that the clot was gradually invaded by the cells of the zona granulosa or theca interna which removed the shed blood, has been disproved by the work of Sobotta on the corpus luteum of the mouse. He shows that hemorrhages do not

occur; and recent work on the human ovary seems to indicate that here, too, the essential change is a great proliferation of the granulosa cells to completely fill and distend the follicle with peculiar luteal cells—large cells containing fat droplets and pigment, and resembling the interstitial cells of the ovary." Loeb discussing the formation of the corpus luteum says that during atresia of the follicles the granulosa degenerates entirely, in the case of the corpus luteum it remains preserved and the cells increase in size and number. He adds, however, that a number of granulosa cells degenerate even in the follicle which has ruptured. His conclusions were based on an examination of the ovaries of 30 guinea pigs, cut into serial sections and microscopically studied. The most recent advocate of this view is Novak. He examined 102 series of human ovaries in a study of function and development and finds in some of his sections an actual transformation of granulosa cells into luteal cells. He says: "The early corpora lutea described by me in this paper fully confirm Meyer's claim that the cells of the membrana granulosa do not undergo degeneration after follicular rupture. Furthermore, the paraluteal cells found in many corpora lutea, constituting a distinct zone between the luteal layer within and the theca externa to the outer side, are, with scarcely a doubt, developed from the theca interna. If this be true, there is no reasonable doubt of the origin of the luteal cells from the epithelium of the membrana granulosa."

If pregnancy supervenes, the corpora lutea become large in size and remain well marked throughout, otherwise they soon degenerate. The cells undergo a change; they lose their distinct outlines, become stained with great difficulty and finally degenerate, forming a mass of scar tissue.

Summary.

1. Luteal cells are developed from the theca cells, those of the membrana granulosa degenerating after the bursting of the follicle.
2. More recently it is held that the granulosa cells do not degenerate and that the luteal cells are derived from these cells, i. e., they are of epithelial origin.

3. During pregnancy the corpus luteum verum remains intact, afterwards degenerating and forming scar tissues; if pregnancy does not supervene, the development is less marked and the corpus luteum spurium, so-called, becomes atresic much more rapidly.

III. *Function of the Corpus Luteum.*

The most exhaustive work on this subject has been performed chiefly by Loeb and Frankel. In this paper the work of Loeb is chiefly quoted, that of Frankel being unavailable. Results of Ancel and Buin and others are taken from their work as quoted by other writers.

The function of the corpus luteum is here discussed under five heads.

(a) *Influence of the corpus luteum on the formation of uterine decidua.*

Frankel, as quoted by Loeb and others, holds that the function of the corpus luteum is to prepare the mucosa of the uterus for the reception of the ovum, this being accomplished by its causing a hyperemia and softening of uterine tissues. Leo Loeb in a series of experiments in which 900 guinea pigs were used, most of whose ovaries were microscopically examined in serial section, comes to the following conclusion:

1. The corpus luteum acts as a formative stimulus on the mucosa and induces growth phenomena of two kinds.

a. In response to a weak stimulus it enables the uterine mucosa to respond with predecidual growth phenomena, chiefly seen in an amitotic nuclear proliferation of decidual cells.

b. In response to strong stimuli its influence leads to the formation of maternal placenta.

However, if the ovaries of a guinea pig are extirpated soon after rupture of the follicles, these growth phenomena do not take place.

2. In all of his cases except one, Loeb found that the corpus luteum is indispensable for the formation of maternal placenta. Its influence is exerted by means of a certain substance which is given off to the body fluids and is thus transmitted to the uterine mucosa.

3. To obtain a maximal effect in the forming of decidual tissues, the influence of the corpus luteum must be exerted continuously; there is a certain co-operation between the me-

chanical stimulus given by the ovum and the chemical influence excited by the corpus luteum.

4. Serial sections showed that this lutean influence acts (in the case of guinea pigs at least) only on the uterine mucosa, and does not affect the mucosa of the uterine tubes, a fact which Loeb accepts as explanatory of the absence of tubal pregnancy in guinea pigs.

5. Intermittent injection of corpus luteum substance into the guinea pig cannot act as a substitute for the continuous action of living corpus luteum, although it has a slight influence. This, Loeb thinks, is due to the fact that there is a small, but continuous discharge of secretion in the normal corpus luteum, which is essential in producing its characteristic effects.

6. Extirpation of the corpus luteum soon after ovulation prevents the formation of maternal placenta which takes place partly under the influence of a mechanical stimulus. If the corpus luteum is extirpated on the second or fourth day after ovulation, small deciduomata frequently form. Later extirpation of the ovaries does not prevent the production of maternal placenta, but diminishes its size.

7. Further, Loeb says it can be experimentally shown that the above function is independent of nervous connection between the uterus and ovaries.

The endocrine action of the corpus luteum is further accentuated by observations of Novak. Of a corpus luteum removed on the 14th day of the menstrual cycle, he says: "The most significant feature of this stage is the invasion of the lutean layer by small blood channels. These are clearly traceable back to the ring of blood vessels which marks the division between the granulosa and the theca. Some of the blood is present in definite endothelium-lined vessels, while some lies free between the cells, making its way to and into the cavity of the corpus." Such a condition, of course, besides carrying nutriment to the cells, enables these to pour their secretion directly into the blood stream.

(b) *Influence of the corpus luteum on fixation of the embryo.*

Schafer states that Frankel, working on a hypothesis suggested by Born, found that if the

corpora lutea are destroyed in early pregnancy (in the case of the rabbit) the embryo does not become adherent to the mucous membrane of the uterus. Marshall and Jolly obtained the same results in work done on dogs and rats.

(c) *Influence of the corpus luteum on the embryo during early pregnancy.*

If the corpus luteum in the guinea pig is removed within the first three days after copulation, according to Loeb, there is no trace of pregnancy. Dick substantiates Frankel's claim that the corpus luteum is apparently essential for the development of the embryo during the early part of pregnancy. He says: "In our experiments, removal of both ovaries within the first two weeks of pregnancy caused absorption of the embryo of every one of a series of 14 rabbits." On removing one ovary, he found that one case resulted in absorption, while in three, pregnancy was not interfered with. From these results, Dick concludes that Mandl is wrong in stating that pregnancy can be maintained in the absence of corpora lutea.

(d) *Influence of the corpus luteum on the sexual cycle.*

In experiments performed on several hundred guinea pigs, Loeb came to the following conclusions regarding the influence of the corpus luteum on the periodicity of the sexual cycle:

1. In both pregnant and non-pregnant animals, the corpora lutea lengthen the sexual period between two ovulations. The hurrying of ovulation after the extirpation of the lutean bodies is not due to a mechanical stimulus, but is due to their removal.

2. Not pregnancy, but the lengthened or protracted function of the corpus luteum, prevents a new ovulation in the pregnant animal.

3. Three conditions are necessary for the occurrence of ovulation:

- a. The time necessary for the ripening of a follicle.

- b. The cessation of corpus luteum activity preventing ovulation.

- c. Partly accidental conditions, such as copulation. Extirpation of the corpora lutea in the guinea pig accelerates bursting of the ripe graafian follicles, i. e., is conducive to ovulation, according to his investigations.

(e) *Influence of the corpus luteum on menstruation.*

The recent work of Novak, already quoted above, briefly summarizes this relationship. His facts, for the most part histological, are the following:

1. During the menstrual life of the normal woman, lutean tissue in some stage or another of development is always found in the ovaries.

2. In the non-menstruating woman, corpora lutea are absent.

3. While fetuses, new-born children, and girls before puberty, show ovaries with a greater or less degree of maturation of the graafian follicles, corpora lutea are never found.

4. Corpora lutea are never found in the ovaries of women who have ceased to menstruate.

5. The amenorrhea of lactation is probably due to an inhibition of lutean influence by the mammary hormones.

6. While Novak found no evidence to explain menorrhagia and metrorrhagia, he inclines to the belief that these are due to functional increase of the corpora lutea, as well as possibly also the influence of the other endocrine organs.

(f) *Influence of the corpus luteum on the mammary gland.*

Schafer summarizes the work of the principal investigators on this point. Ancel and Bouin, as well as O'Donoghue, found that if a graafian follicle be ruptured in a virgin rabbit (even by mechanical means) so that a corpus luteum develops, the mammae undergo evolution; however, if the corpora lutea do not develop, there is no such evolution. Hammond and Marshall state that under such conditions, the mammary development may proceed as far as the free secretion of milk. Ott and Scott obtained the same results by injecting young virgin rabbits subcutaneously at frequent intervals for a month with extract of corpus luteum. Ancel and Bouin further state that if all the corpora lutea are destroyed in a pregnant rabbit, the development of the mammary gland is arrested.

Summary.

1. The corpus luteum makes possible the formation of maternal placenta by supplying a

sensitizing substance to the uterine mucosa.

2. Fixation of the embryo is aided by the activity of the corpora lutea.

3. The corpus luteum is apparently essential for the development of the embryo early in pregnancy.

4. The presence of corpora lutea militates against ovulation, i. e., lengthens the sexual cycle, at least in the guinea pig.

5. The presence or absence of corpora lutea means presence or absence of menstruation, and possibly their hypo or hyper-function means, in part at least, dysmenorrhea or menorrhagia.

6. The activity of lutean secretion affects development of the mammary gland, even to free secretion of milk.

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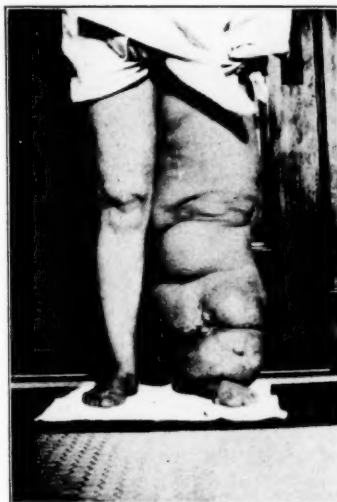
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ELEPHANTIASIS: REPORT OF A CASE IN MINNESOTA.

A. N. BESSESEN, M. D.,
Minneapolis, Minn.

Elephantiasis is a disease of such rare occurrence in Minnesota that I am taking the liberty to report a case that was under my care during the last year of her illness, which was gradually progressive, with only slight remissions, up to the time of her death.

The patient, Miss J., was born at Jamestown, N. Y., of healthy Norwegian parents, May 27, 1874, and moved to Cannon Falls, Minn., when three years old. She had typhoid fever when four years old and was very sick, so much so that she had to learn to walk again after her recovery. She moved to Minneapolis when fifteen years old and was never out of the state of Minnesota after that. When sixteen years old she cut her left leg on a nail, suffering a rather severe injury near the ankle. This left a jagged infected wound that was slow to heal. The patient ascribes her elephantiasis to this injury. Otherwise she was always in good



health, normal mentally, and of cheerful disposition. She lived at home and worked in a local laundry where she was on her feet most of the time.

At the age of thirty she first noticed a slight swelling on the left leg at the ankle near the nail injury. This gradually extended but was painless and gave no trouble except for the deformity. The limb continued to enlarge from that time regardless of treatment by various medical men. The limb finally became so large, in the course of years, that the weight and awkwardness interfered with walking and she had to give up work. She suffered no other discomfort or pain, except that at intervals she would have an attack of elephantoid fever.



When the circulation seemed to stop in the limb, it would become very pale with a feeling of pain; this would be followed by an intense redness, almost erysipelatous, with elevation of body temperature. The limb would become enormously swollen, and in two or three days the skin would break where most distended and discharge large quantities of watery fluid. This would result in a rapid reduction in size of the limb until it seemed only two or three times larger than normal. The skin abrasion would heal promptly and the condition of elephantiasis would gradually return to its former size and probably somewhat larger, extending toward the body. At the time that I was first called, she was in such an attack more severe than at any previous time. The disease at that time involved the left hip as well as the thigh and the lower leg. The calf of the leg measured fully thirty-six inches in circumfer-

ence. Later, after the attack had subsided, I saw her at my office and the limb measured thirty-four and one-half inches about the calf, and thirty-two and one-half inches about the knee. At the time the accompanying picture was taken, the limb measured thirty-two inches about the calf and twenty-nine and three-quarter inches about the knee. I did not find evidence of tuberculous or syphilitic infection, although no Wassermann test was made. I desired to show her case to other medical men but she had become so sensitive of her condition that it was with difficulty that I could obtain her consent to an examination of her blood by Dr. Guah, a native of India. He made an examination for filaria, and while he may have found a single one, he could not be certain, and the patient would not permit a second examination. Dr. Guah said, however, that the case was in every way similar to elephantiasis so common in India.

The patient, while in my care, suffered a severe attack of elephantoid fever from February 15th to March 3rd, 1916, a second milder attack from September 22nd to September 29th, 1916, and a third attack from March 10th to 13th, 1917, that proved fatal. The patient died March 13, 1917.

After the death of the patient, the undertaker could not inject the vessels of the left side from the shoulder down. The limb and left side to the shoulder was enormously swollen. Death was probably due directly to pressure of the oedematous tissues on the heart. The skin burst and gallons of watery fluid ran from the body through the break in the skin so that the casket had to be lined with lead to prevent leakage of fluid.



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EDITORIAL

THE URGENT NEED FOR DOCTORS.

Telegrams have been received by the members of the State Council of the Medical Defense stating as follows:

"An urgent need exists for several thousand additional Medical Officers in the Army and Navy, some for immediate work, some for training, and others to be held in reserve. Please urge your State and County committees to speed up enrollment as effectively as possible."

F. F. Simpson.

Dr. Thomas McDavitt has been called to a special meeting in Chicago for this purpose. Every member of the State Association is urgently requested to consider fully this matter with a view of entering the Army Medical Service.

THE FORTHCOMING ANNUAL MEETING OF THE AMERICAN MEDICAL ASSOCIATION.

The Sixty-Ninth Annual Session of the American Medical Association will be held in Chicago next month, June 10-14. The Committee on Arrangements is actively engaged in perfecting plans for the comfort and entertainment of the Fellows of the Association and their guests, and every member of the Minnesota State Medical Association should make an effort to attend.

Several special features of general interest are promised.

The chairman of the subcommittee on clinics, Dr. Charles F. Humiston, announces that there will be a series of clinics for the Fellows of the Association on Thursday, Friday and Saturday, June 6, 7, and 8, and on Monday and Tuesday, June 10 and 11. Further announcements regarding the clinics will appear later.

In addition to a patriotic meeting which will be held on Thursday evening, June 13, and which will be addressed by men prominent in public affairs, there will also be a general meeting on Wednesday evening, June 12, at which eminent physicians who have been active in the medical military service of our nation and its allies will take part.

At its recent meeting the Council on Scientific Assembly arranged for meetings of the Section on Miscellaneous Topics, the subject to be taken up being the re-education and rehabilitation of the disabled soldiers. Major Frank Billings, head of this division in the Surgeon-General's Office, has accepted the chairmanship of the section. The subject is one of great importance, especially to medical men. Further announcement will be made later.

Alumni and section dinners will be held on Wednesday evening from 6 to 8 o'clock so as not to conflict with other events which are being planned. The chairman of the subcommittee on alumni and section entertainment, Dr. J. H. Stowell, announces that his committee is co-operating with officers of alumni associations in arranging for reunions. The committee desires, also, to assist the officers of those sections which desire to arrange for section dinners.

The Executive Officers of the Local Committee on Arrangements are as follows:

Ludvig Hektoen, Chairman.

Charles J. Whalen, Secretary.

William A. Pusey, Treasurer.

John V. Fowler, Frank Billings,

Hugh T. Patrick, James B. Herrick,

Malcolm L. Harris, Chas. E. Humiston.

All correspondence with this committee or with any of its subcommittees should be addressed to 25 East Washington St., Chicago.

THE JUNE MEETING OF THE SOUTHERN MINNESOTA MEDICAL ASSOCIATION.

The summer meeting of the Southern Minnesota Medical Association will be held at Winona next month, June 24 and 25. The program, which will be published in the next issue of "*Minnesota Medicine*," promises to be most interesting and it is hoped that a full attendance will reward the painstaking efforts of the Association's Program Committee. The meetings will be held at the Masonic Temple in Winona and there will be an evening session on June 24 which will be opened by a banquet and followed by two addresses, one, the oration in surgery, which will be illustrated, will be given by Dr. John Lyncoln Porter, of Chicago, and the other, the oration in medicine, by Dr. J. E. Engstad, of Grand Forks, N. D., on "Feeding vs. Starvation in Typhoid Fever." The days' programs will be so varied as to appeal to all practitioners. Entertainment for visiting physicians will be in charge of the Winona County Medical Society.

OSTEOPATHS AND MORPHINE.

The question has been brought to our attention whether or not osteopaths are permitted to prescribe or administer morphine under the laws of the State of Minnesota. The question as to the legality of such has been submitted to the Attorney General of this state. His reply is final and needs little comment. It is as follows: "An osteopath cannot prescribe morphine or administer the same hypodermically or otherwise under the laws of our state. Chapter 260, Laws of 1915, designates who may prescribe or administer morphine in this state, and an osteopath is not among those so designated.

The fact that an osteopath may have a permit from the federal government to administer narcotics, does not give such osteopath the right to administer the same in this state in violation of the statutory law thereof."

Therefore, although osteopaths are permitted under the law of Minnesota to prescribe drugs for external use and to perform minor surgery, and are allowed to register under the Harrison Narcotic Law, they are not allowed under the Minnesota laws either to prescribe or to administer morphine in this state.

FOOD PRODUCTS.

War is making great demands on our food supply. It has made an accurate knowledge of the uses of cereals, meats, fish, milk, eggs, butter, oils, and many forms in which our food products are now being manufactured, a very important part of the physician's work.

New conditions not only demand the exercise of all the skill, but the trained intelligence of physicians, to provide the special kinds of diet best adapted to the ages and physical requirements of the public, as well as their patients. War conditions also make it imperative that physicians who buy for their own families, for sanitariums, and other public institutions, be thoroughly familiar with the constituents of bread, meat products, fish, as well as the many new foods which changed conditions have produced.

The Journal of the American Medical Association (March 9th) discusses "New Food Products," the use of which it is said is being encouraged by government authorities. These include such fish as shark and whale meat; the canning of evaporated vegetables, such as carrots, turnips, potatoes, onions, peas, and beans; bread made from bananas, sweet potatoes, breadfruit, etc. In fact, so much public interest is now centered in the food supply, that new substitute foods are not only "encouraged" by the government, but are being manufactured. There are a large number of new "nut" butters on the market, besides many animal oleomargarines. It is highly important in these times of "food conservation" to make extensive use of the many vegetable oils, such as peanut, cocoanut and olive; they also have a high caloric value. Necessity and opportunity

have stimulated the manufacture of new food products. No physician will keep abreast of the development of all lines of foods, unless he gives this subject his careful attention.

Physicians should be familiar with the relative food values of wheat, corn, oats, barley, rice and other cereals. What percentage of proteins and carbohydrates are found in meat, eggs, fish, milk, potatoes, beans, corn? Which foods are best adapted to particular conditions? What are the relative dietetic values of malted foods, grape juice, baking powders, gelatins, condensed milks, and the scores of other well known food products?

AN ACKNOWLEDGMENT.

We desire to extend our deep appreciation and thanks to the Pennsylvania Medical Journal for the following:

"The first number of *Minnesota Medicine* made its appearance in January, with the Minnesota State Medical Association, owner and publisher. The size of the printed page is the same as our journal and the editorial and mechanical work is in every way worthy of the medical profession of Minnesota. This is the twenty-eighth state medical journal that follows the plan of admitting to its advertising pages only such articles as comply with the rules of the Council on Pharmacy and Chemistry of the American Medical Association. It is difficult to harmonize the double standard adopted by some medical journals published on a purely business basis where the editorial management and the advertising department are supposed to be independent one from the other. It must be humiliating for some of our medical editors who are recognized as honorable and ethical to reflect on the conflict between the scientific matter and the advertisements in their journals."—*Pennsylvania Medical Journal*, March, 1918.

PROPAGANDA FOR REFORM.

Revolutionary changes in the medical sciences have been so numerous and so rapid that the general practitioner has been unable to keep pace with them. In the resulting confusion the nostrum maker has seen his opportunity for exploiting his useless, unscientific or dangerous preparations. Because of the danger of ther-

apeutic chaos, the American Medical Association established the Council on Pharmacy and Chemistry to place the results of therapeutic progress before the medical profession in an impartial manner. Are you availing yourself of the work of the Council and using drugs of established value, or are you prescribing proprietaries on the advice of their promoters? Keep abreast of the times. Read the *New and Non-official Remedies* and the *Propaganda for Reform* published each month in *Minnesota Medicine*.

Notice.

To The Secretaries of County Societies:

You will confer a favor by reporting to me, any deaths of members having occurred since the last meeting of the State Association, together with the name of a friend or relative of the deceased who is in a position to give information desired in making a report.

Yours truly,

A. E. Spalding,

Committee on Necrology.

Luverne, Minn., April 18, 1918.

OF GENERAL INTEREST

MINNESOTA'S HONOR ROLL.*

The following members of the medical profession of Minnesota are now in the service of the United States and its Allies in the War for Humanity and Democracy:

Lt. John S. Abbott, St. Paul, 18th F. A., B. E. F., France.

Lt. Stewart H. Anderson, Wells, Cleveland, O.

Lt. P. A. Ashley, Minneapolis, Signal Corps Detachment, St. Paul, Minn.

Capt. J. V. Avery, Minneapolis, 44th Infantry, Camp Lewis, Mich.

Lt. Burton A. Baird, Rochester, Fort Riley, Kan.

Maj. L. B. Baldwin, Minneapolis, Duty in Surgeon-General's Office, Washington, D. C.

Lt. Robert I. Barickman, Lewisville, Camp Custer, Battle Creek, Mich.

Lt. Moses Barron, St. Paul, Base Hospital No. 26, Lakewood, N. J.

Lt. Bret V. Bates, Wheaton, Fort Omaha, Neb.

- Lt. Parker L. Berge, Brainerd, Signal Corps, Aviation Camp, Waco, Texas.
- Lt. Alick Bernstein, Naytahwaush, Fort Riley, Kan.
- Lt. Ralph B. Bettman, Rochester, Bellevue Hospital, New York City.
- Lt. Grover C. Black, Minneapolis, Park Field Signal Corps Aviation School, Memphis, Tenn.
- Lt. Francis G. Blake, Minneapolis, Fort Sam Houston, Texas.
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- Lt. Paul F. Brown, Minneapolis, Camp Lewis, Wash.
- Lt. Herman C. Bumpus, Jr., Rochester, Fort Riley, Kansas.
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- Lt. Andrew Christiansen, St. Paul, F. H. C. No. 135, Camp Cody, Deming, N. M.
- Lt. Jean B. Clair, Winsted, Fort Logan H. Roots, or Fort Riley, Kan.
- Lt. Charles M. Clark, Rochester, Fort Riley, Kan.
- Maj. Chester H. Clark, Duluth, Camp Hospital, Aviation Section, Waco, Texas.
- Lt. Thomas G. Clement, Vernon Center, Fort Oglethorpe, Ga.
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- Lt. Carl C. Cowin, Adrian, Base Hospital, Camp Lee, Va.
- Maj. Bronson Crothers, St. Paul, Camp Jackson, N. C.
- Capt. Jared W. Daniels, St. Peter, 339 Field Artillery, 88th Division, Camp Dodge, Ia.
- Lt. Karl Dedolph, St. Paul, U. S. Army Balloon School, Fort Omaha, Neb.
- Lt. T. H. Dedolph, Braham, Fort Riley, Kan.
- Maj. Warren A. Dennis, St. Paul, Neurological Institute, New York.
- Geo. W. Dewey, Fairmont, Fort Riley, Kan.
- Lt. John J. Donovan, Litchfield, Presbyterian Hospital for instruction and on completion to Camp Sherman.
- Lt. Henry E. Douglas, Hutchinson, Fort Riley, Kan.
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 Lt. Hugh H. Slocumb, Belgrade, Fort Riley, Kan.
 Lt. George W. Snyder, Bell Plaine, Field Hospital, Camp Dodge, Des Moines, Iowa.
 Capt. Olaf Sohlberg, St. Paul, Ambulance Co. No. 135, Camp Cody, Deming, N. M.
 Lt. J. E. Soper, Minneapolis, 151st F. A., 42d Division, A. E. F., France.
 Lt. Robert E. Spinks, Middle River, Camp Grant, Rockford, Ill.
 Maj. J. C. Staley, St. Paul, Base Hospital Co. No. 26, Lakewood, N. J.
 A. F. Strickler, Sleepy Eye, Fort Riley, Kan.
 Maj. Kenneth Taylor, St. Paul, 55 Rue de Verneuil, Paris, France.
 Capt. Gilbert J. Thomas, Minneapolis, Base Hospital No. 26, Lakewood, N. J.
 Lt. H. A. Thompson, Minneapolis, Base Hospital, Camp Custer, Battle Creek, Mich.
 Maj. Frank C. Todd, Minneapolis, Base Hospital, Camp Dodge, Des Moines, Iowa.
 Capt. Rudolph H. Wald, Hastings, Camp Doniphan, Fort Sill, Okla.
 Lt. Joseph D. Waller, Wilmot, Camp Grant, Rockford, Ill.

- Lt. Percy A. Ward, Minneapolis, Army Medical School, Washington, D. C.
 Lt. Samuel D. Weaver, Rochester, Fort McPherson, Ga.
 Lt. Merritt Wheeler, Glencoe, Fort Riley, Kan.
 Maj. J. S. White, St. Paul, Sanitary Inspector, 92d Division, Camp Funston, Fort Riley, Kan.
 Maj. S. M. White, Minneapolis, Base Hospital No. 26, Lakewood, N. J.
 Lt. Frank W. Whitmore, St. Paul, Ann Arbor, Mich.
 Lt. Albert E. Williams, Backus, Fort Riley, Kan.
 Lt. Leon A. Williams, Slayton, Fort Logan H. Roots, Ark.
 Maj. Louis B. Wilson, Rochester, Duty in Surgeon-General's Office, Washington, D. C.
 Lt. Irving G. Wiltrout, Minneapolis, Camp Grant, Rockford, Ill.
 Lt. Otto Winter, St. Paul, Harvard Medical Unit, Y. M. C. A., Boston, Mass.
 Lt. Wm. R. Winne, Rochester, Camp Grant, Rockford, Ill.
 Lt. Paul W. Wippermann, Minneapolis, Ambulance Co. No. 10, Fort Sam Houston, San Antonio, Texas.
 Lt. John R. Wood, Hallock, 343d Infantry, Camp Grant, Rockford, Ill.
 Capt. H. B. Zimmermann, St. Paul, Base Hospital No. 26, Lakewood, N. J.

*This list is made up from all available sources at hand, and is corrected as far as possible up to April 10th. Members of the State Association who may be aware of any changes or corrections in the above list are asked to bring them to the attention of the Editorial Staff.

Lieut. John S. Abbott, M. R. C., attached to the 18th F. A., B. E. F., is reported in the casualty list of April 15, as missing in action.

Dr. Abbott, a practicing surgeon of St. Paul, received his commission early in June of 1917 and immediately left for France, assigned to the British forces. He was one of the first physicians to answer the call of Gen. Gorgas for medical officers to assist the British forces.

The success of Clinical Week, under the management of the Hennepin County Medical Society, has been such as to insure that it will

be made an annual affair in Minneapolis. The attendance of physicians from outside of the city has been almost four hundred, or more than twice as many as had been expected. Some of them came from as far away as Montana.

The wealth of clinical material afforded by the city's fourteen hospitals, maintaining no less than twenty-two hundred beds, affords the essential basis for such an institution, while the leadership of Minneapolis in the profession is of so high a character as to attract progressive practitioners from all over the Northwest.

Clinical Week has been founded on a broad basis. It covers the whole field of the healing art—internal medicine as well as surgery. The specialists have demonstrated in their various lines for the benefit of professional visitors, the treatment of children's ailments having had special attention.

Notwithstanding "ethical" obstacles in the way of securing for Clinical Week the helpful sort of publicity that would be given to a similar effort in almost any other line, the medical profession's rule against self-advertisement has not altogether prevented the public from learning much about what has been done. And the prospects for the continued growth and usefulness of this admirable enterprise are promising indeed.

The following hotels have been tentatively designated as general and section headquarters for the A. M. A. meeting in Chicago next month:

General Headquarters: Hotel Sherman, North Clark and West Randolph.

Practice of Medicine: Hotel Morrison, 83 West Madison.

Surgery, General and Abdominal: Auditorium Hotel, 430 South Michigan.

Obstetrics, Gynecology and Abdominal Surgery: Congress Hotel, South Michigan and Congress.

Ophthalmology: Hotel La Salle, La Salle and West Madison.

Laryngology, Otology and Rhinology: Hotel La Salle, La Salle and West Madison.

Diseases of Children: Congress Hotel, South Michigan and Congress.

Pharmacology and Therapeutics: Auditorium Hotel, 430 South Michigan.

Pathology and Physiology: Auditorium Hotel, 430 South Michigan.

Stomatology: Congress Hotel, South Michigan and Congress.

Nervous and Mental Diseases: Blackstone Hotel, South Michigan and East Seventh.

Dermatology: Blackstone Hotel, South Michigan and East Seventh.

Preventive Medicine and Public Health: Auditorium Hotel, 430 South Michigan.

Genito-Urinary Diseases: Auditorium Hotel, 430 South Michigan.

Orthopedic Surgery: Congress Hotel, South Michigan and Congress.

Gastro-Enterology and Proctology: Auditorium Hotel, 430 South Michigan.

Scientific Exhibit, Registration Bureau, Commercial Exhibit, Information Bureau, and Branch Postoffice: Hotel Sherman, North Clark and West Randolph.

In comparison with the tax levied in England on incomes, our own income taxes are moderate, indeed.

In England the tax on incomes of \$1,000 is 4½ per cent, in America nothing.

In England the tax on incomes of \$1,500 is 6¾ per cent; in America nothing for married men or heads of families, and 2 per cent on \$1,500 for an unmarried man.

In England the tax on an income of \$2,000 is 7⅞ per cent; in America nothing for a married man or head of a family, and 2 per cent on \$2,000 for unmarried men.

The English income tax rate also increases more rapidly with the growth of the income than ours, a \$3,000 income being taxed 14 per cent, \$5,000 16 per cent, \$10,000 20 per cent, and \$15,000 25 per cent, while our corresponding taxes for married men are respectively two-thirds of 1 per cent, 1½ per cent, 3½ per cent and 5 per cent, and only slightly more for the unmarried, due to the smaller amount exempted, the rate being the same.

Dr. W. A. Meierding, Springfield, Minn., who enlisted in the Medical Reserve Corps several months ago, departed April 5th for Camp Grant at Rockford, Ill.

Dr. J. Wellcome was re-elected Mayor of Sleepy Eye, Minn., at the recent spring election.

Dr. A. F. Strickler, Sleepy Eye, who enlisted in the Medical Reserve Corps last August, left for Fort Riley, Kan., April 5th.

A meeting of the Olmsted County Medical Society was held in the Assembly Room of the Mayo Clinic, Rochester, April 10, 1918. Dr. E. C. Rosenow reported on a recent trip to Fort Riley where he went to investigate the epidemic of pneumonia. The subject of pneumonia was further discussed by Dr. Rosenow, Dr. H. Witherstine and Dr. von Hess. Two other papers were presented: "The care of the premature infant," by Dr. R. Taylor; and "Skin grafting," by Dr. J. C. Masson.

The third assignment of officers from the Medical Reserve Corps completed the six weeks' course in general surgery at the Mayo Clinic, April 1, and the fourth group of officers have arrived to take the course.

Major C. H. Mayo returned April 12th, after three weeks' absence in Washington, Fort Oglethorpe and New York.

Major W. J. Mayo departed April 13th for Washington to be absent about three weeks. He will carry on the work assigned to him in the Surgeon General's Office.

Dr. O. E. Belcourt who, with the exception of four or five years' absence in the province of Quebec, has been engaged in the practice of medicine since 1882 at Argyle, Marshall county, recently gave up active work and has gone to LaFlesche, Sask., Can., to reside with a son who is a practicing physician at that place.

Dr. Baldwin Borreson of Warren and Dr. R. E. Spinks of Middle River, Marshall county, were both called to report for active "Military Service" on April 10th.

Dr. H. H. Clark has recently located at Edgerton, Minn.

The Program Committee of the Southern Minnesota Medical Association consists of Dr. E. Starr Judd, Dr. J. P. Sedgwick and Dr. A. F. Schmitt. The summer meeting will be held at Winona, June 24th and 25th.

The personnel of the Mankato Medical Advisory Board is as follows:

Dr. J. S. Holbrook.
Dr. D. J. Harrison.
Dr. V. I. Miller.
Dr. G. A. Dahl, Secretary.
Dr. A. F. Schmitt, Chairman.

NEW AND NON-OFFICIAL REMEDIES

During March the following articles were accepted by the Council on Pharmacy and Chemistry for inclusion with New and Non-official Remedies:

Calco Chemical Company:
Chlorcosane (Calco)

Gilliland Laboratories:
Normal Horse Serum
Concentrated and Refined Diphtheria Antitoxin
Concentrated and Refined Tetanus Antitoxin
Typhoid Vaccine
Small-pox Vaccine
Original Tuberculin, "O. T."
Tuberculin Ointment in Capsules (for the Moro Percutaneous Diagnostic Test)
Bouillon Filtrate Tuberculin, "B. F."
Bouillon Emulsion Tuberculin, "B. E."
Tuberculin Residue, "T. R."
Tuberculin for the Detre Differential Diagnostic Test

Monsanto Chemical Works:
Dichloramine-T

NEW AND NON-OFFICIAL REMEDIES.

Typhoid Vaccine, Prophylactic.—A vaccine made from killed *Bacillus typhosus*. The vaccine is used for the prevention of typhoid fever, for which purpose typhoid vaccines are of recognized utility. Marketed in different sized containers, containing 500 million and 1,000 million killed *Bacillus typhosus* in 1 Cc.. Eli Lilly and Company, Indianapolis.

Typhoid Vaccine, Therapeutic.—A vaccine made from killed *Bacillus typhosus*. The vaccine is proposed for the treatment of typhoid carriers and as a concomitant measure to the usual routine of typhoid therapy. Marketed in different sized contain-

ers, containing 100, 250, 500 and 1,000 million killed *Bacillus typhosus* in 1 Cc.. Eli Lilly and Company, Indianapolis.

Typhoid Mixed Vaccine (Typho-Bacterin Mixed).—A vaccine made from killed alpha and beta *Bacillus paratyphosus* and *Bacillus typhosus*. The vaccine is used for the immunization against typhoid and paratyphoid fevers and in the treatment of mixed infections of the typhoid bacillus and the paratyphoid bacilli. Marketed in different sized containers, containing 250 million alpha and beta *Bacillus paratyphosus* and 1,000 million *Bacillus typhosus* in 1 Cc., and 500 million alpha and beta *Bacillus paratyphosus* and 1,000 million *Bacillus typhosus* in 1 Cc.. Eli Lilly and Company, Indianapolis.

Bulgarian Bacillus Tablets-Mulford.—Tablets containing a practically pure culture of *Bacillus bulgaricus*. Used in the prevention and treatment of conditions due to intestinal putrefaction. Marketed in vials containing fifty tablets. An expiration date is stamped on the label. H. K. Mulford Company, Philadelphia. (Jour. A. M. A., March 2, 1918, p. 623).

Arsenobenzol (Dermatologic Research Laboratories) 1 Gm. Ampules.—Each ampule contains 1 Gm. arsenobenzol (Dermatologic Research Laboratories), a brand of arsenamine complying with the New and Non-official Remedies standards. These ampules are prepared for use in hospitals in divided doses. Dermatological Research Laboratories, Philadelphia Polyclinic, Philadelphia.

Halazone-Monsanto.—A brand of halazone complying with the New and Non-official Remedies standards. Halazone is parasulphonedichloramidobenzoic acid. The Monsanto Chemical Company, St. Louis, Mo.

Procaine-Abbott.—A brand of procaine complying with the New and Non-official Remedies standards. Procaine was first introduced as "novocaine." Chemically it is the monohydrochlorid of para-aminobenzoylethyl-amino-ethanol. It is used as a local anesthetic as a substitute for cocaine. The Abbott Laboratories. (Jour. A. M. A., March 16, 1918, p. 779).

PROPAGANDA FOR REFORM.

Shotgun Nostrums.—As the soldier of today uses a rifle instead of a blunderbuss, so the modern physician uses single drugs rather than shotgun mixtures. There are many types of "shotgun" nostrums. Some are dangerous, as in the case of "Bromidia;" some are preposterous therapeutic monstrosities which excite the contempt of educated physicians, as in the case of "Tongaline;" some are merely useless mixtures of well known drugs sold under grotesquely exaggerated claims, as in the case of "Peacock's Bromides." It is impossible to determine from the published formulas just how much hydrated chloral and potassium bromide Bromidia contains; but it is probable that there are about 15 grains of each of these two drugs to the fluidrachm and va-

riable amounts of Indian cannabis and a small amount of either extract or tincture of hyoscyamus. Bromidia is a distinctly dangerous mixture for indiscriminate use, particularly so if the advertising creates the impression that in it the chloral hydrate has been deprived of its untoward effects. Tongaline is said to consist of tonga, cimicifuga racemosa, sodium salicylate, colchicum and pilocarpin. This jumble of drugs would be merely ludicrous, if anything that degrades therapeutics could be considered so lightly. Peacock's bromides is said to consist of the bromides of sodium, potassium, ammonium, calcium and lithium. The exploiters claim superiority over extemporaneously prepared mixtures because of the absence of contaminating chlorids said to be present in commercial bromids. The truth is that the chlorids are used as antidotes in bromid poisoning. Bromidia, Tongaline and Peacock's Bromides have been the subject of reports of the Council on Pharmacy and Chemistry. (Jour. A. M. A., March 2, 1918, p. 642).

Some Misbranded Nostrums.—“Notices of Judgment,” reporting prosecutions for misbranding under the Federal Food and Drugs Act, have been issued for the following: Hayseen's Sure Goitre Cure Balsam, a solution of potassium iodid in water, sugar and alcohol. Hayseen's Sure Goitre Ointment, containing petrolatum and potassium iodid.—MacDonald's Atlas Compound Famous Specific No. 18, consisting essentially of sodium sulphate, sodium bicarbonate, a laxative plant drug (apparently aloes), ginger, a small amount of phosphate, a trace of alkaloid and talc.—Faucine, said to be a “warranted remedy” for piles, diarrhea, dyspepsia, scratches of horses and “good” for female complaints, “hog cholera” and other conditions.—Contrell's Magic Troche, containing a little ipecac and claimed to cure catarrh, asthma and diphtheria.—Benn Capsules contain strychnin, arsenic, iron and water soluble sulphates, and are sold as a cure for dyspepsia, backache, headache, leukorrhea, falling of the womb, etc.—Collins' Voltaic Electric Plasters, claimed to relieve pain and inflammation of the kidneys, of value in fever and ague and “good” for simple bone fracture, and would relieve many cases of bronchitis and asthma, female weakness, etc.—Mother Noble's Healing Syrup, containing vegetable cathartic drugs, iron chlorid, Epsom salt and sand.—Stuart Buchu and Juniper Compound, containing no appreciable amounts of buchu and juniper. (Jour. A. M. A., March 9, 1918, p. 718).

Medeol Suppositories.—The Council on Pharmacy and Chemistry reports that Medeol Suppositories appear to be an imitation of Anusol Suppositories, which in 1907 were found inadmissible to New and Non-official Remedies. “Anusol” was formerly said to be bismuth iodoresorcinulphionate, but after publication of an analysis in the A. M. A. Chemical Laboratory in 1909, this claim was abandoned and today Anusol Suppositories are said to contain unstated amounts of the indefinite “bismuth oxidid

and resorcinulphionate.” “Medeol” is said to be “resorcinated iodobismuth,” but no information is vouchsafed as to the character or composition of the ingredient. As the composition of the two preparations are similar, so are also the therapeutic claims. The Council declared Medeol Suppositories inadmissible to New and Non-official Remedies because their composition is secret, because unwarranted therapeutic claims are made for them, because the name is objectionable, and because the combination is unscientific. (Jour. A. M. A., March 9, 1918, p. 719).

Sodium Cyanid.—Loevenhart, Lorenz, Martin and Malone report experiments looking toward the use of sodium cyanid, administered intravenously, as a means of stimulating respiration in threatened collapse from drowning, etc. (Jour. A. M. A., March 9, 1918, p. 692).

Hypophosphites for the Army.—The purchasing department of the medical department of the U. S. Army asks for bids on three tons, in one pound bottles, of the “Compound Syrup of Hypophosphites.” These six thousand bottles of a relic of past generations must be paid for and are to occupy valuable freight space in shipping to various Army posts. (Jour. A. M. A., March 16, 1918, p. 783).

Melubrin.—Chemically, melubrin is closely related to antipyrine. It acts as an antipyretic and analgesic and is said to be useful in sciatica, neuralgias and in febrile affections, and as an antipyretic in febrile affections. In Sollmann's Pharmacology, in a discussion of coal-tar antipyretics, it is stated that practical experience has shown that acetphenetidin, acetanilid and antipyrine are the most useful representatives of the group, and that all the others may well be spared. (Jour. A. M. A., March 23, 1918, p. 874).

Thyroid Hyperplasia and Iodin.—The evidence indicates that simple goiter is associated with a deficiency of iodine in the thyroid gland and that goiter formation may be prevented by iodine administration. Marine and Kimball have undertaken a study of goiter prevalence and its prevention by administration of iodine at the request of the Committee on Therapeutic Research of the Council on Pharmacy and Chemistry. In a complete census of the condition of the thyroid gland in girls from the fifth to the twelfth grades of a school population of a large community at the southern edge of the Great Lakes goiter district, they found that 2,184 or 56 per cent, had enlarged thyroids, 13 per cent having well defined persistent thyroglossal stalks. (Jour. A. M. A., March 23, 1918, p. 848).

Tyree's Antiseptic and Aseptinol.—This was claimed to be a combination of “borate of sodium, alumina, carbolic acid, glycerin and the crystallized principles of thyme, eucalyptus, gaultheria and mentha.” “Pulv. Aseptinol Comp.” is claimed to combine boric acid, the salts of aluminum, crystallized phenol, and the active crystalline principles of thymus, mentha and gaultheria. As a twin may differ from his brother

by a wart, so Aseptinol was claimed to contain hydragris canadensis in addition. An analysis of Tyree's Powder showed it to be essentially a mixture of boric acid, zinc sulphate with insignificant amounts of odorous principles. In view of the misrepresentation in one case, it is difficult to understand why it should have been taken for the model of the other. These twin nostrums have been exploited by similar preposterous claims; they are utterly unfit for the treatment of the various conditions for which they are or have been recommended.

More important than the relative merits of nostrums such as these is the question whether the medical profession is going to help to perpetuate the chaotic conditions that the use of such nostrums fosters. (Jour. A. M. A., March 30, 1918, p. 949).

Compatibility of Phenolphthalein.—It is better not to combine several laxatives, but those who believe in doing this may combine phenolphthalein with drugs that can properly be prescribed in powders or pills as, for instance, calomel. Since phenolphthalein and calomel are both tasteless, they may be prescribed in powders or enclosed dry in capsule, cachet or wafer, the amount of each ingredient being estimated according to the susceptibility of each patient. (Jour. A. M. A., March 30, 1918, p. 950).

Barbital (Veronal) Classed as a Poison by England.—Because of frequent reports of accidents and habit formation, the Privy Council of Great Britain has classified as poisons "diethylbarbituric acid, and other alkyl, aryl, or metallic derivatives of barbituric acid, whether described as veronal, propional, medinal, or by any other trade name, mark or designation; and all poisonous urethanes and ureides." As a result veronal will seldom be dispensed except on a physician's order, and that a record of such sales will be kept in the pharmacist's poison book. (The official name for diethylbarbituric acid of the British Pharmacopoeias is barbitalone; in the United States the official designation for this product is barbital). (Jour. A. M. A., March 30, 1918, p. 953).

REPORTS AND ANNOUNCEMENTS OF SOCIETIES

MINNESOTA ACADEMY OF MEDICINE.

The regular monthly meeting of the Minnesota Academy of Medicine was held on Wednesday evening, March 13th, the president, Dr. Cross, in the chair. Twenty-six members and two visitors were in attendance. In the absence of the secretary, Dr. J. E. Hynes acted as secretary pro tem. The minutes of the previous meeting were not read.

Under the head of Reports of Cases, a number of offerings were made. Dr. Wilcox exhibited various types of splints, with photographs of the splints in

use. Dr. Wright reported a case of rupture of the testicle. Dr. Farr recently operated for cleft palate under local anesthesia, reporting the same to the Academy. Dr. Abbott, in a case of tuberculous peritonitis with unusual clinical symptoms, found the focus of infection to be in the Fallopian tube; and Dr. Hare reported a similar condition of tuberculosis where the focus of infection was in the appendix—the Fallopian tubes were also involved. Dr. Mann spoke of a patient who suffered a fracture of the third lumbar vertebra, the patient later developing an osteomyelitis that necessitated the amputation of both legs. Still later there developed an osteoporosis of the head of the femur. A bone graft from one of the patient's ribs was followed with apparently good results. Dr. Moore mentioned a case of elephantiasis involving the left hand only. Dr. Dunsmoor gave the history of a patient who had a pathological fracture of the humerus, caused from a round-cell sarcoma. The fact that the fracture was not accompanied by any palpable change in the bone, gave to the case a very unusual clinical aspect.

Dr. Frank Wright read a paper entitled "Shall Operation for Hypertrophied Prostate be done in Two Stages?" which was fully discussed by Drs. Schwyzer, Earl, Colvin, Wilcox, and Farr.

REPORTS OF CASES.

The following case was reported by Dr. Hammes: A man 54 years of age was found unconscious in the back of a saloon, apparently having fallen down stairs. He was brought to the hospital with a suspected fracture of the skull. An X-ray examination proved negative. There was, however, a most marked bilateral spasticity of all four extremities, with a bilateral patellar clonus and ankle-clonus; also a double Babinski. A lumbar puncture was made and about 30 c. c. of pure blood withdrawn. A Wassermann made from this blood was positive. For four days the patient remained moribund; then gradually improved. Another lumbar puncture was made, the spinal fluid being of a yellowish color and under normal pressure. At the end of the second week, the patient was conscious, the spasticity had disappeared entirely, there was normal control of the extremities, and the reflexes were normal, except for a slight Babinski on the left side. At the end of the fourth week another lumbar puncture was performed at nine in the morning, and 5 c. c. of normal-colored spinal fluid withdrawn. At seven o'clock in the evening of the same day the patient became suddenly cyanotic, dyspneic, unconscious, and died. A post-mortem examination was made on the skull only. It showed a fracture of the right parietal bone, extending upward, with a marked intradural hemorrhage from the left Rolandic region, and some softening. There was marked evidence of a contra-coup, in that there was softening in the right temporal region of the brain. This, together with the marked clinical improvement in spite of the pathologic feature, was the interesting feature of the case. The immediate cause of death, apparently, was a pulmonary embolus.

Specimen of a stomach removed January, 1918. Presented to the Academy by Dr. H. B. Sweetser. History: Male, aged fifty-two. About a year ago he began to have discomfort in the epigastrium, especially after a heavy meal. Yet he enjoyed eating, his appetite was good, and he did not vomit. There was a slight loss of weight at this time which was restored upon forced feeding. The X-ray gave a typical picture of carcinoma of the stomach. Because of the very meagre clinical symptoms, a great deal of surprise was experienced at the time of operation at the extent of the lesion, which extended from the pylorus along the lesser curvature for a distance of three and one-half inches. It involved both the anterior and posterior walls of the stomach, leaving at the pylorus less than an inch of normal wall, adjacent to the greater curvature. There was no visible glandular involvement and no metastasis to the liver. So much of the stomach was, of necessity, removed that it was impossible to do a gastroenterostomy. The technic of Polya was employed. Recovery from the operation was smooth and satisfactory. The patient now is eating a full diet and is up and about the hospital.

Dr. Arthur T. Mann reported a congenital deformity of the genitals in a girl of nineteen. The uterus was absent; there had been no menstruations nor any symptoms of a menstrual period. The hymen and vagina were normal up to the vault of the vagina, which, here, spread from side to side in a broad, smooth arch like an umbrella. At the extreme corners, on either side, was a small, red, funnel-shaped opening where the remnants of the ducts of Mueller entered. These ducts had failed to fuse and produce an uterus, and there was nothing felt on either side to suggest the separate parts of a double uterus. It was as though the ducts of Mueller might have formed tubes corresponding to the Fallopian tubes which opened directly into the vagina at the angles. The fact that there had been none of the symptoms which go with menstruation, suggests that the ovaries are rudimentary also. The case must be exceedingly rare. More common are those cases where the ducts fuse, the form of the uterus varying with the amount of fusion. The bicornate and unicornate uterus, the uterus with a septum, and the double uterus are examples of this type. When the Muellerian ducts fuse below the uterus, the septum failing to absorb, we have the double vagina and the double hymen; when the lower end fails to open, we have the imperforate hymen.

Dr. Mann also reported a case of double uterus with a double vagina in which the woman had given birth to a full-term child from the left uterus with laceration of the cervix on that side and a complete rupture of the vaginal septum. She presented herself some years ago for a repair of the lacerated cervix. He had seen two cases of bicornate uterus, in one of which a doctor in one of the smaller towns had performed a supravaginal hysterectomy for some unknown cause. He also reported a case of imper-

forate hymen in girl of seventeen, who had all the symptoms of menstruation for four years with increasing pain and distress, but without the flow, and in whom all the remains of the menstrual flows were imprisoned behind a tough, bulging hymen in a dilated uterus and vagina.

FRED. ELMER LEAVITT,
Secretary.

PROGRESS IN MEDICINE AND SURGERY

ROENTGENOLOGICAL SECTION.

Edited by Frank S. Bissell, M. D.

INTRODUCTORY.

It is our purpose to present under this caption a brief but comprehensive resumé of current or recent roentgenological literature. Editorial comment may be made, from time to time, to clarify or supplement the more important subject matter.

Roentgenologists throughout the world have responded so generously to the war call that there has been a noticeable decline in the volume of current literature dealing with the progress and problems of this branch of medical science. Hence, the reader may occasionally find here extended reference to articles, not very recent in origin, but whose age has not destroyed their semblance of modernity.

SARCOMA AND THE ROENTGEN RAYS: Sarcoma we have always with us, and it seems to present constantly new phases for discussion and investigation. There has been noted a wide variability in the sensitiveness of sarcoma to the roentgen rays, and this variability has been attributed variously to the seat of the lesion, and to its degree of malignancy. However, G. F. Gaarenstroom, in the *Archives of Radiology and Electro-Therapeutics*, Vol. XXL, No. 7, believes that this sensitiveness depends directly upon the histological structure of the tumor.

He reports twenty-three cases which were treated by the roentgen method at the Dutch Cancer Institute of Amsterdam, and reviews them as follows:

Round Cell Sarcoma; twelve cases, all of which have responded favorably to roentgenization. Some of these have remained symptom free, while others, though locally cured or improved, have finally died from metastases.

Spindle Cell Sarcoma; three cases only, two of which have shown favorable reaction.

The Polymorphous Type: There were four of these cases, none of which have shown the slightest response.

The writer concludes, therefore, that it is necessary to know the type of sarcoma with which one is dealing, before an intelligent prognosis can be made as to the result of roentgen therapy in these cases. He confesses, however, that his series is too small

to establish a hard and fast rule. In fact, one can find in the literature reports of many cases of polymorphous cell sarcoma, which have been improved or cured under roentgen therapy.

Kienboeck's rule that those sarcomata which develop rapidly, and recur promptly after operation, are the most favorable cases for roentgenization, is not supported by the writer's observations. Thus, he points out that sarcomata of the fibula, femur and upper jaw, while of rapid growth, failed to react favorably, whereas a slowly developing angio-sarcoma of the tympanic cavity responded promptly and was cured.

ROENTGEN TREATMENT OF 530 CASES OF MALIGNANT AND OTHER TUMORS OF THE FACE: H. W. Dachtler (Am. Jour. of Roentgenology, Vol. IV, No. 1) states that sixty-two per cent of the cases were diagnosed as malignant, but in the absence of microscopical diagnosis, he classified the series according to the area involved.

The writer observes that in the earlier part of the sixteen years covered by the report, a large number of malignant conditions of the eyelids were referred to the roentgenologist, because the common destructive methods could not be applied without danger to the eye. Also, in the earlier years, it was not customary to refer cases with lesions of the nose, ear or cheek, until repeated attempts at destroying them by cautery had failed. At the present time, the cases are referred earlier because physicians are more convinced of the efficiency of the roentgen method.

The more favorable locations appear to be the forehead, upper lip and chin, while less favorable are the cheek, the cartilages of the nose and of the external ear.

In the eye cases, the small percentage of failures were in advanced lesions involving deep structures. "Taking the series as a whole, it may be confidently asserted that they could not have been as satisfactorily dealt with by any other method. In such cases, roentgen therapy is without a peer. On the other hand, if a case does not yield in a reasonable time, nothing is gained by continuing and it is wise to institute some other treatment in the hope of effecting relief."

The author's observations relative to cancer of the lower lip are interesting: In the earlier years, cases which were clinically of the squamous cell type, without glandular involvement, were treated by the V-shaped excision followed by roentgen treatment of the cervical glands. "Unless glands were already in-

involved, the results accomplished by this method were as favorable as those following the radical operation."

Later, in selected cases roentgen therapy was applied to the lesion as well as to the glands, and results have been as good as in the earlier cases treated by the combined method.

Lupus and lupus erythematosus have not responded well, in the hands of the writer. All cases of keloid were cured or improved.

PULMONIC INSUFFICIENCY AND STENOSIS:

The literature upon this subject has, in the past, dealt almost exclusively with congenital pulmonic stenosis in combination with patent Ductus Botalli. J. Zodek, however, in the *Fortschritte auf dem Gebiete der Roentgenstrahlen*, Vol. XXIII, No. 4, reports at length a case of acquired pulmonic stenosis and insufficiency which came to autopsy under a mistaken diagnosis of aneurism. The roentgen observations in this case had been the following: The heart enlarged markedly and uniformly in all directions, pulsation excursions not marked. Aortic column very wide. On the left side, at the level of the 3rd and 4th ribs (rather low), there is noted a large rounded prominence, lying upon the left ventricle below, while above it is "fused" with the aorta, from which it cannot be sharply differentiated. Left auricle not distinguished. There is no visible pulsation of this shadow. Since the patient has a deep, thick-walled thorax, observations in the first diagonal and frontal dimensions were unsatisfactory. A diagnosis of aneurism of the descending aorta was made, but aneurism of the pulmonary artery was also considered because of the low position of the most prominent convexity.

The autopsy, however, revealed an endocarditis chronica verrucosa of the pulmonic valves. There were calcium deposits, shrinking, and fixation of all the leaflets, producing distinct stenosis and insufficiency. There were no changes in the arterial walls.

Since all symptoms of this lesion had apparently developed subsequent to an attack of acute polyarthritis five years before, the inference was that it was acquired at that time.

The author finds the differential diagnosis of this condition a difficult one. However, his case demonstrates that in the presence of such a lesion, a marked prominence of the pulmonary convexity, non-pulsating, and apparently overriding the left ventricle and auricle, may be noted.

**EAT
CORN
SAVE
WHEAT**



**FOOD
WILL WIN
THE
WAR**



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